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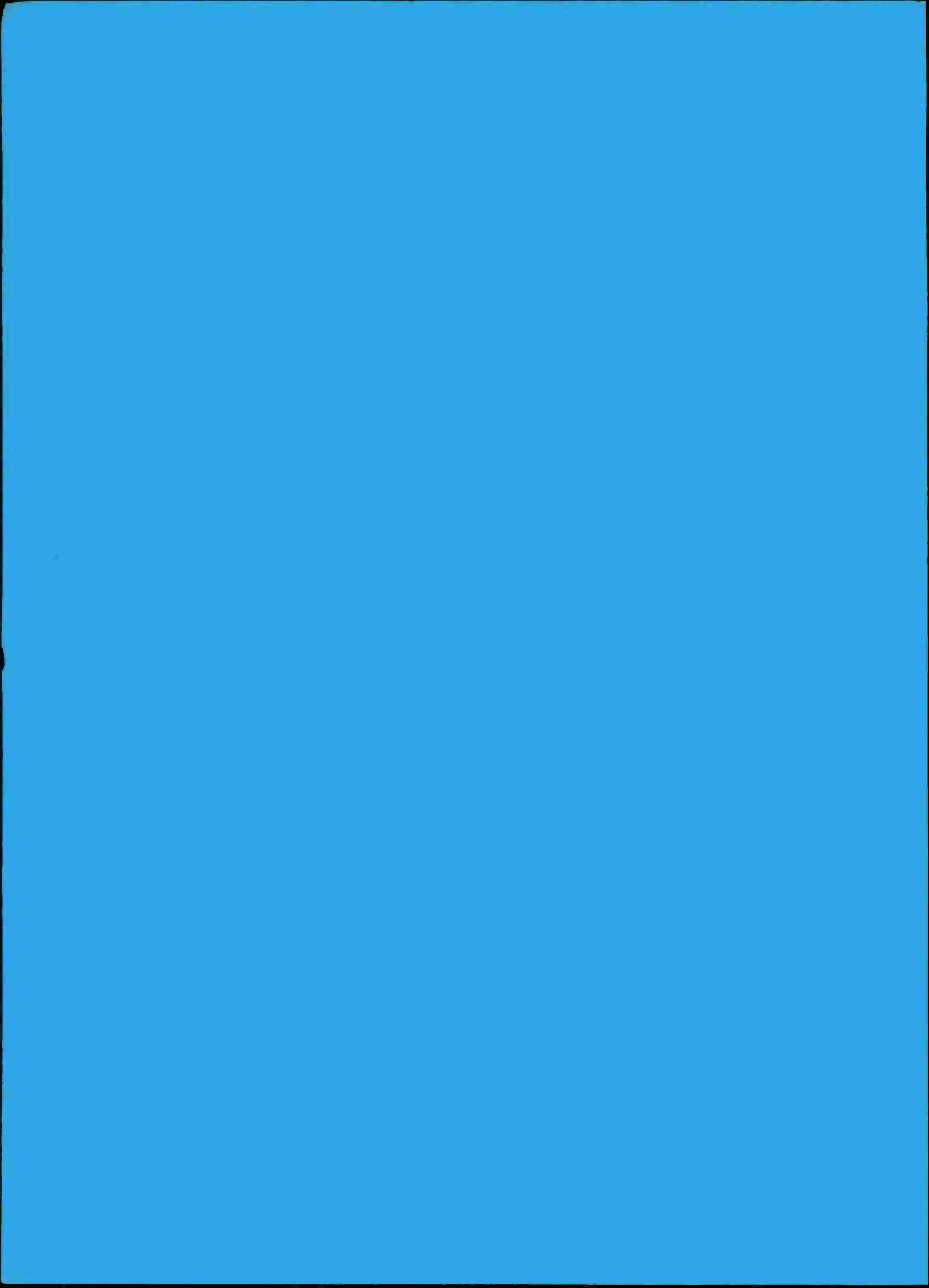
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OCTOBER 1975

**SHIPBOARD COMPUTER INTEGRATED INSTRUCTION
IN GENERAL DAMAGE CONTROL: DEVELOPMENT PHASE**

**William G. Hoyt
Alfred K. Butler
Charles D. Hayward**

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October 1975

SHIPBOARD COMPUTER INTEGRATED INSTRUCTION
IN GENERAL DAMAGE CONTROL: DEVELOPMENT PHASE

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Prepared for

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Instruction (CII). In CII, instruction is conducted off line and is integrated with on-line testing, diagnostics, and prescriptives. The off-line training media for this effort are programmed instruction, audio visual, and self-study guides. General Damage Control is the prototype subject area because of its criticality during emergency situations aboard ship, and because relatively few shipboard personnel receive training in this area at shore-based schools. This report describes: (1) program development, system operation, and user procedures for CII; (2) design and development of the CII courseware and module tests; (3) shore-based demonstration and checkout; and (4) installation of the CII system aboard a demonstration ship.

The follow-on shipboard test/evaluation will be conducted by the Navy.

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FOREWORD

This effort was performed under Technical Development Plan 43-03 (Education and Training Development) and Work Unit Number 43-03.P14X (Design/Development of Shipboard Computer-based Instruction and Training Administration). It was initiated in response to a request from the Chief of Naval Operations (OP-99) to determine the feasibility of utilizing shipboard computer systems for training applications aboard combatant ships. The computer systems considered included those already installed to support tactical operations, and those which could be added to shipboard inventory--e.g., minicomputers. This report describes the shore-based development and shipboard installation of a minicomputer-based Computer Integrated Instruction (CII) prototype system, developed in conjunction with a Shipboard Training Administration System (STAS). The STAS effort is described in a separate report (NPRDC TR 76-11, Shipboard Training Administration System: Development Phase). Both of these efforts were accomplished by the System Development Corporation (SDC), Santa Monica, California under Contract Number N00600-74-C-0399. Dr. David J. Chesler was the technical contract monitor for the Navy Personnel Research and Development Center (NAVPERSRANDCEN).

A project concerned with the feasibility of using minicomputers aboard a combatant ship necessarily depends upon the cooperation and assistance of several Navy organizations. In this instance, support has been most generous. The Information Systems Division, CNO (OP-91) procured, installed, and maintained the shipboard minicomputer system. The Commander, Naval Surface Force, U. S. Atlantic Fleet (COMNAVSURFLANT) designated a demonstration ship, USS DAHLGREN (DLG 12) for shipboard checkout of CII. Priority commitments have precluded use of DAHLGREN for a subsequent test and evaluation which, however, is planned with another ship and the same minicomputer system. Personnel from OP-91, COMNAVSURFLANT, DAHLGREN, the Fleet Training Center, San Diego (FLETRACEN), and the Service School Command, San Diego (SERVSCOLCOM), provided invaluable expertise enhanced by practical experience in the shipboard environment. NAVPERSRANDCEN and SDC gratefully acknowledge the contributions of:

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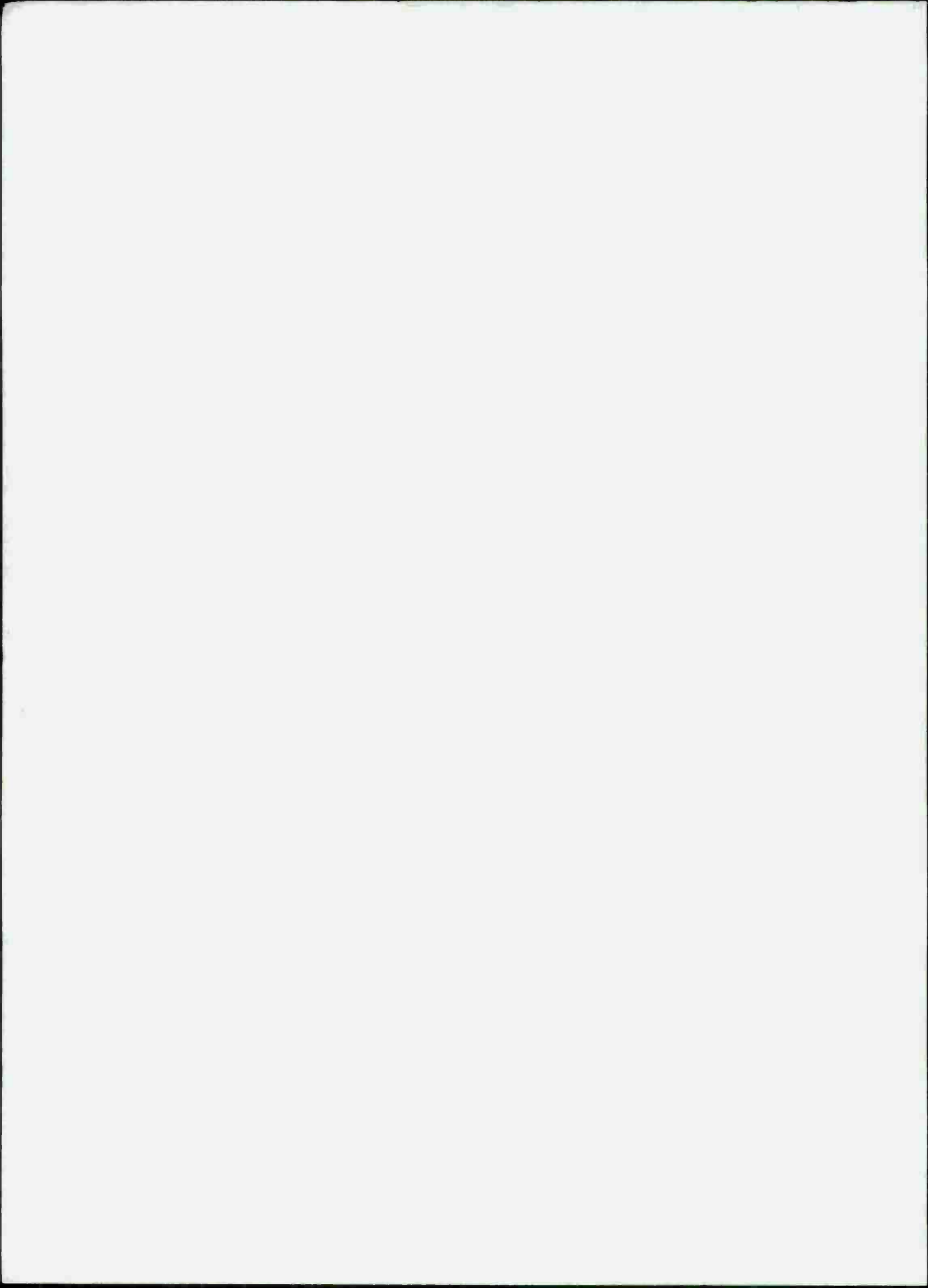
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SUMMARY

Problem

The increasing costs of moving shipboard personnel to, and maintaining them at, shore-based schools have dictated the need to accomplish more training aboard ship. Shipboard computer systems have been used to perform functions in support of tactical operations. An additional goal has been the use of computers to support nontactical activities, such as instruction and training administration. Computers permit individualized, self-paced, adaptive learning. Computer systems that have been considered for training applications include those already aboard for purposes other than training, and those that can reasonably be added to shipboard inventory--e.g., minicomputers. This report describes the development of a prototype minicomputer-based system for shipboard Computer Integrated Instruction (CII), in which instruction is accomplished off-line and is integrated with on-line testing, diagnostics, and prescriptives. General Damage Control was selected as the prototype CII subject matter area.

Background and Requirements

In August 1972, the Chief of Naval Operations (OP-91) initiated a study to determine the feasibility of a shipboard minicomputer system capability for command/management purposes. USS DAHLGREN (DLG 12) was selected by the Commander, Naval Surface Forces, U. S. Atlantic Fleet (COMNAVSURFLANT) to serve as the prototype unit for this capability. A NOVA 1200 system was installed aboard the ship in January 1973.

The Navy Personnel Research and Development Center (NAVPERSRANDCEN) had independently initiated a project to determine the feasibility of using a shipboard minicomputer system for instructional and training administration purposes. NAVPERSRANDCEN was invited by OP-91 and COMNAVSURFLANT to share the NOVA 1200 system on the DAHLGREN for these applications.

The two basic requirements were development of: (1) CII in General Damage Control, and (2) a Shipboard Training Administration System (STAS) to facilitate the recording, processing, and reporting of training information.

The present document reports the development and shipboard installation of the CII application. The STAS development effort is described in a separate report. The development phase of both CII and STAS was accomplished ashore with contractual support. The subsequent shipboard test and evaluation will be conducted and reported by the Navy.

Approach

The development of the CII computer programs was accomplished with a NOVA 1200 system compatible with the DAHLGREN configuration. The operating system RJDOS, Version 3.2 and Extended BASIC, Version 3.6 were used.

The programs were designed as a series of overlays to be operated in a multi-user environment and in the swapping mode of BASIC. The CII system contains an executive program and 19 subprograms. In addition, CII has two data files: a student data base, and an examination statistics file. Eight pretests and eight posttests are maintained on cassettes and loaded into the system as required for student users. These pretests and posttests correspond to eight (of the 15) subject matter areas in the current Personnel Qualification Standard (PQS) for General Damage Control that were selected for prototype CII courseware development. The programs and data files permit data base maintenance, situation and demand report generation, and examination management. Input is through any of four CRT's or teletype. Output is through these devices and a line printer. Students use the CRT's for on-line testing, diagnostics, and prescriptives. They receive a hardcopy of test results, diagnostics, prescriptives, and course status.

Development of the off-line lessonware paralleled computer program development. The goal was approximately 24 hours of instruction, plus 6 hours of on-line testing. The modes of instruction were programmed instruction, self-study guides, audiovisual instruction, and audio instruction. The procedures used to develop the lessonware followed established principles of instruction development. The basic development steps were: (1) selection and analysis of subject matter areas, (2) development of instructional materials and criterion items, (3) design of course modules, (4) development of instructional materials, (5) validation of test items, and (6) tryout of the CII course on a representative target population. A shore-based demonstration was conducted as a final tryout/checkout of on-line and off-line materials and procedures, and was followed by installation on DAHLGREN.

Recommendations

1. Specific learning objectives for General Damage Control PQS modules developed under this project should be applied throughout the Navy (see page 54).
2. Similar learning objectives for General Damage Control PQS topics not included in the prototype CII course should be developed (see page 54).
3. Test modules developed for the CII course should be used throughout the Navy to identify personnel below desired proficiency levels. The test modules can be easily adapted for off-line use--i.e., for ships lacking computer capabilities (see page 55).
4. The off-line lessonware developed for the CII course should be disseminated Navy-wide, and the methodology and instruction media used should be applied to other areas where day-to-day shipboard operations do not normally exercise the skills and knowledges required (see page 55).

5. The methodology and principles used for developing CII course materials should be applied to training courses and standards for new equipment systems (see page 55).

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SECTION 1. INTRODUCTION

1.1 Problem. Computer systems and technology have been used aboard combatant ships for many years to perform functions in support of tactical operations. An additional goal has been the use of computer systems to support nontactical activities, such as instruction and training administration. At present, training is normally conducted in shore-based schools, with some shipboard training provided based on the Personnel Qualifications Standards (PQS) program. This shipboard training usually consists of instruction by subject matter specialists, and study of applicable Navy publications. Examinations are either practical exercises or paper-and-pencil tests. As progress points are accumulated, they are entered on the student's Qualification Card (NAV-EDTRA 43119-2AQ1). There is no computer management of training or on-line testing. Audiovisual materials and other self-paced instruction are limited. Instead, group instruction is used, with the result that slow and fast learners must progress at the same pace.

1.2 Background. In August 1972 the Chief of Naval Operations (OP-91) undertook a study to determine the feasibility of an automated data processing (ADP) capability aboard combatant ships for Maintenance and Material Management (3M), personnel administration, and supply. The ship selected as a prototype unit for development of the ADP capability was USS DAHLGREN (DLG 12). The System Development Corporation (SDC) was tasked to recommend and install a minicomputer hardware/software system aboard the ship. The NOVA 1200 system was selected and installed in January 1973.

In July 1973 the Navy Personnel Research and Development Center (NAVPERSRANDCEN) independently initiated a project to determine the feasibility of using a minicomputer system aboard combatant ships for instruction and training administration applications. Subsequently, NAVPERSRANDCEN was invited by OP-91 to use the NOVA 1200 system on DAHLGREN for this purpose. The result was a joint endeavor by NAVPERSRANDCEN, OP-91, and Commander, Naval Surface Force, Atlantic Fleet (COMNAVSURFLANT). The instructional application was to be conducted in a Computer-Integrated Instruction (CII) mode, in which instruction is conducted off line and is integrated with on-line testing, diagnostics, and prescriptives. General Damage Control (GDC) was selected as the prototype subject area because of its criticality during emergency situations aboard ship, and because relatively few shipboard personnel receive training in this area at shore-based schools. A Shipboard Training Administration System (STAS) was also to be developed in conjunction with CII to facilitate the recording, processing, and reporting of training information for planning, scheduling, and other administrative purposes. SDC was tasked to develop the CII and STAS applications in November 1973.

1.3 Objective. The overall objective of the Computer-Integrated Instruction (CII) project is to increase the operational readiness of crews aboard combatant ships by providing an onboard computer-based training capability. Specific project objectives include the following:

- Develop a CII application for a shipboard minicomputer system.
- Select GDC topics for multimedia individualized instruction.
- Conduct a training analysis and establish training objectives.
- Develop individualized multimedia instructional materials for off-line use.
- Develop and validate performance-based criterion items to assess performance in GDC.
- Conduct small- and large-group evaluations of CII ashore prior to shipboard installation.

1.4 Scope. This document reports the development and installation of the CII application. The STAS project is described in a separate report (Hayward, Hay, & Jaffin, 1975). The shipboard installation completed SDC's participation in this effort. The subsequent shipboard test and evaluation will be conducted and reported by the Navy.

SECTION 2. COMPUTER PROGRAM DESIGN AND DEVELOPMENT

The design requirements for shipboard CII were prepared in cooperation with personnel from NAVPERSRANDCEN, COMNAVSURFLANT, and CNO (OP-91). These requirements were formulated and submitted for Navy review in January 1974. The initial programming effort began in March 1974 and was completed in sufficient time prior to a shore-based demonstration in November 1974.

2.1 Shore-based Development Facility. SDC arranged to obtain NOVA 1200 computer time at a facility in Fairfax, Virginia. Additional equipment was installed at this computer site to ensure compatibility with the DAHLGREN configuration, viz., a three-unit cassette tape drive, a multiplexer controller, and two CRT terminals. The hardware components were:

- NOVA 1200 (32K-word core memory)
- Disk Drive (fixed head, 256K words)
- Teletype-compatible CRT terminal
- Cassette Drives (3 units)
- Line Printer (132 column)
- CRTs (2)
- Magnetic Tape Drive (1 reel type)

For program development, SDC used the Real-time Disk Operating System (RDOS), Version 3.2. CII was programmed in Extended BASIC, Version 3.6,

and planned for multi-user operation. The programs were designed as a series of overlays. Early size estimates indicated that the swapping mode of BASIC was required.

During development, the operating system and the BASIC interpreter were maintained on magnetic reel tape rather than on tape cassettes to save loading time. Program code was input on line at the CRT under BASIC control and backed up on tape cassettes. No punched cards or punched tapes were used. The current operating system and BASIC were delivered with the CII package.

2.2 Shipboard Minicomputer System. At the time of shipboard installation (1 December 1974), the DAHLGREN minicomputer hardware consisted of:

- NOVA 1200 (32K-word core memory)
- Disk Drive (1 fixed head, 256K)
- Disk Drive (1 moving head, 1.2 million-byte)
- ASR 33 Teletype
- Cassette Drives (6 units)
- Line Printer (132 columns)
- CRTs (4)
- Card Reader (225 CPM)

2.3 System Structure. The shipboard CII application was tailored to the NOVA 1200 system aboard DAHLGREN, which is capable of providing on-line examination, diagnostics, and prescriptives, and accepting the results of off-line practical exercises. The total CII package, in addition to these capabilities, provides off-line individualized training consisting of programmed instruction (PI), audiovisual (A/V) instruction, audio (A) instruction, and self-study guides (SSG). At present, this training encompasses only GDC PQS requirements for the eight subject matter areas selected to provide a prototype CII system (see Section 3).

The CII system contains one executive program and 19 overlay subprograms. (The overlay structure is designed to minimize waiting between functions.) The executive program accepts commands and data, transfers control to appropriate subprograms for indicated operations, and allows for validity checks to minimize data-introduced errors. The subprograms provide the capability for module testing, presenting diagnostic and prescriptive information, audit trail recording, data base maintenance, and training personnel interaction.

Two main data files support CII processing: (1) the student data base and (2) the examination data base. The student data base is a general

record depository for student data. It can hold information for a maximum of 100 active students. The data base contains the student's name and SSN for identification and data elements in which to record his CII module status, pretest and posttest results, start and completion dates, and practical test results. It is used and automatically updated by the CII programs. It may also be modified by the Training Official. The student data base is loaded for each CII run, and is updated and saved on cassette tape at the end of each run.

The examinations data base consists of 16 physical files maintained on cassette tapes corresponding to each of the 8 pretest and 8 posttest CII module examinations. The cassette tape files are loaded to the disk as required to support the on-line student users. The examinations files contain the questions, answers, automatic fail flag, and prescriptive information for each module. It is not modified during normal operations.

These programs and data files permit examination management, data base maintenance, and situation and report generation. CII removes the burden of pencil-and-paper examinations. Since the system monitors a student's progress throughout his training, he immediately knows the results of his studies and is directed to remedial material if necessary. The CII file and report structure is shown in Figure 2-1.

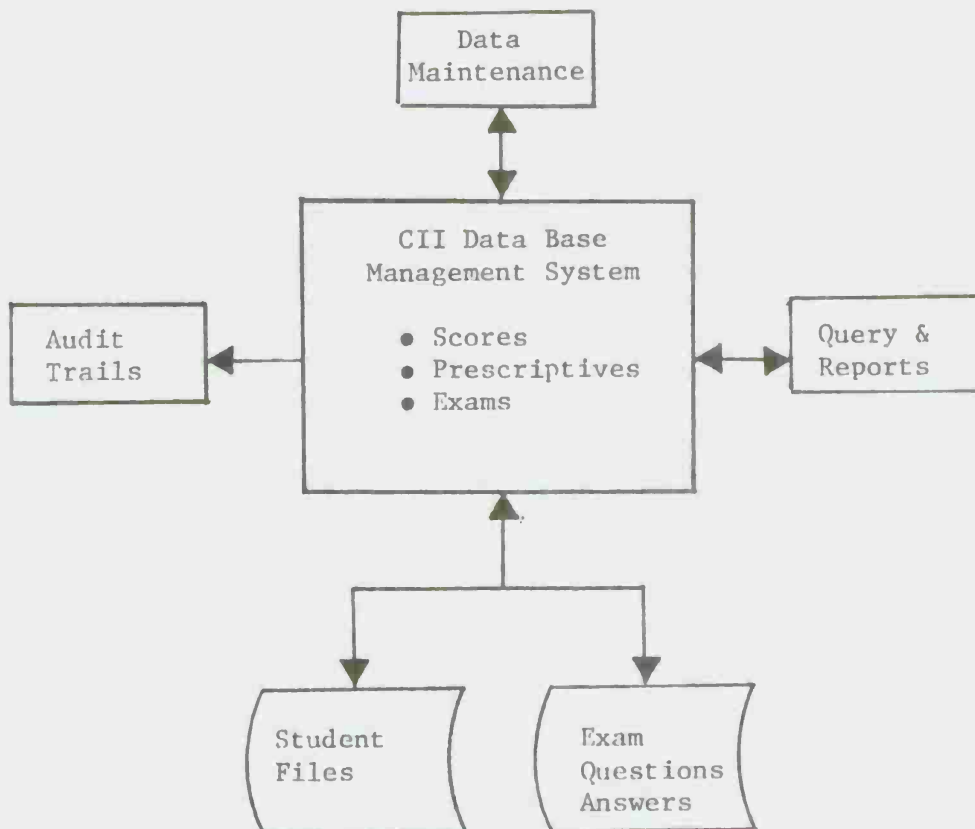


Figure 2-1. CII file and report structure.

2.4 System Operation. The CII system may be operated from any one of the four CRT terminals aboard ship or the teletype. The teletype is used by the Training Official and the Computer Operator.

Eleven commands are available to the users: BYE, CHANGE, DELETE, DISP, INIT, LOAD, SCRATCH, STAT, POINTS, EXAM, and CII COMPLETE. The student can use only three of these commands: DISP, EXAM, and BYE. These commands are described in Shipboard Computer Integrated Instruction (NAVPERSRANDCEN UM-02).

CII is initiated and controlled by the Training Official who begins CII processing by (1) requesting a load of CII programs and (2) inputting the proper initiation commands at the teletype. After CII is loaded and operational, any legal student (one who has had an SSN recorded in the CII student data files by the Training Official for identification) may use the CRT terminals for prescriptive direction and/or module examination. CII system flow is shown in Figure 2-2.

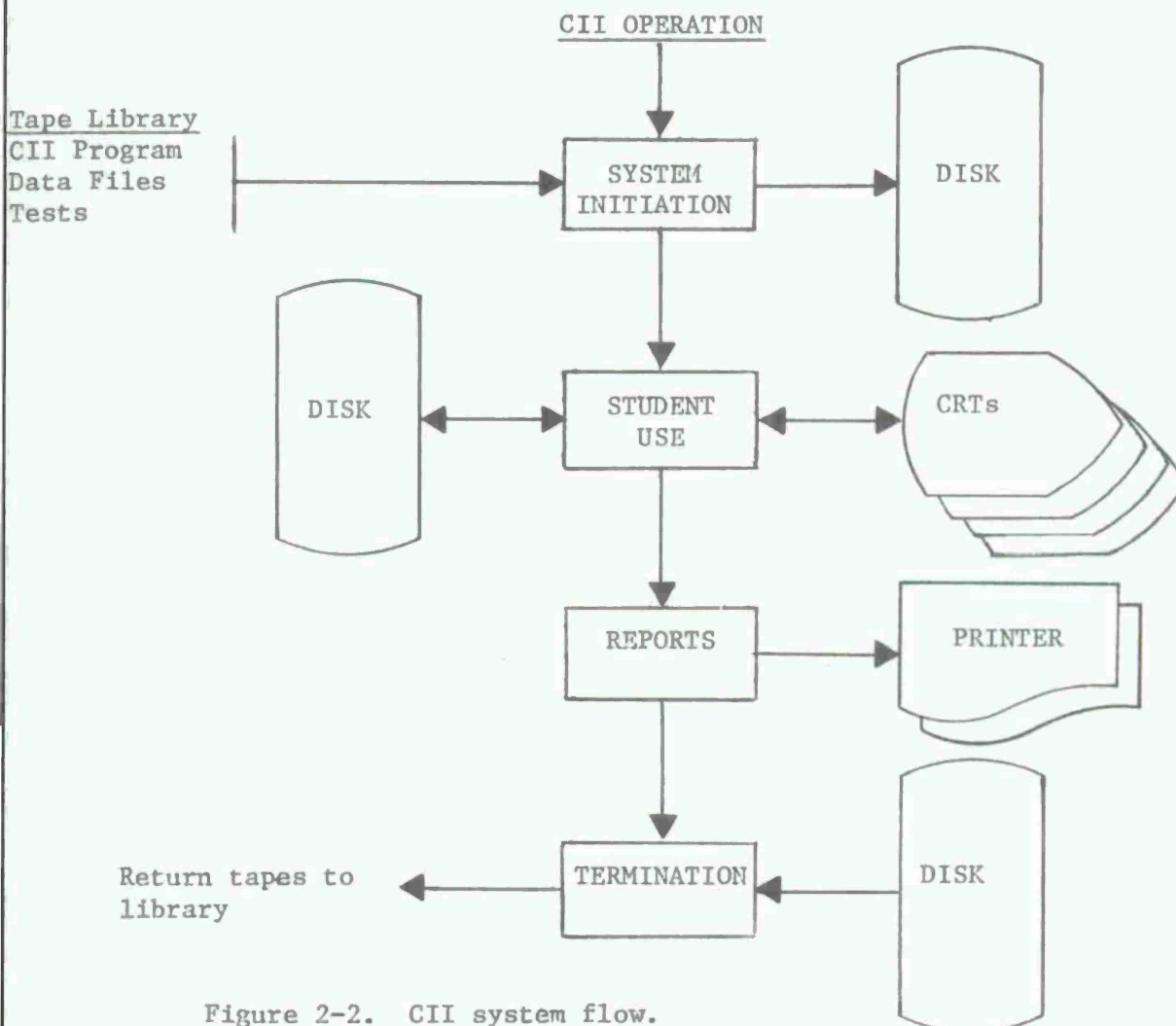


Figure 2-2. CII system flow.

Before starting the course, the student should examine the available GDC modules, discuss the course with the Training Official, and be prepared to select his first CII module pretest. When CII processing is initiated, the display shown in Figure 2-3 will appear on the screen. At this point, the student can select any one of the three commands at his disposal. If he selects DISP, a display of his current GDC CII status will appear on the screen. Figure 2-4 is an example of a record display for a student who has completed three CII modules. If he selects EXAM, a "shopping list" of CII module examinations will appear (see Figure 2-5). If he selects BYE, he will be logged off.

CII EXAMINATION
GENERAL DAMAGE CONTROL
USS DAHLGREN

The following examinations you are about to take relate to your continuing progress in mastery of General Damage Control for USS DAHLGREN.

You may now:

1. Check your status	(Type DISP)
2. Take a test	(Type EXAM)
3. To logout	(Type BYE)

COMMAND?

Figure 2-3. CII user control commands.

123-45-6789			FRANKLIN D. JONES				
MODNO	POS	PASS	SCORE	SDAT	CDAT	PRESCRIPTIVES - MODULE 6	
1	52	42	44	741111	741113	2207:1:HNF	2207:1:HNF
2	29	23				2207:1:HNF	2207:1:HNF
3	13	10	10	741115	741115	2207:2:81	2207:2:9-14
4	6	4					
5	43	34					
6	62	50	56	741117	741117		
7	43	43					
8	44	33					
PQS	POS	CUM					
2101	10	8					
2102	20						
2103	20						
2104	15	15					
2201	10						
2202	10						
2203	10						
2204	5						
2205	10						
2206	15	12					
2207	15						
2208	20						
2209	10						
2210	10						
2401	191						

Figure 2-4. Standardized CII student record display.

From the following list select the next CII GDC module you wish to take. If this is a new module, you will be given a pretest. If you are working on a posttest, it must be completed and is shown below. If you require a practical exercise, score it as shown below.

1. 2101
2. 2102
3. 2104
4. 2203
5. 2206
6. 2207
7. 2208
8. 2210

ENTER TEST NO. 1-3:

Figure 2-5. CII user control "shopping list."

After the student selects the specific module he wishes to study, he stays with that module until he has completed it. A pretest is required for all modules and is taken once. The pretest question set begins with an identification of the module selected. The questions are displayed one at a time on the screen and will remain displayed until an answer is input by the student. An example appears in Figure 2-6. When the test is completed, the results will be displayed immediately. If he passes (see Figure 2-7), he receives credit for the module and may proceed to the next without taking a posttest. If he fails, however (see Figure 2-8), he is referred to diagnostics and prescriptives that are keyed to test questions (which are in turn keyed to specific off-line material). These prescriptives are automatically recorded in the student's record in the data base. This examination procedure is shown in Figure 2-9.

GENERAL DAMAGE CONTROL - USS DAHLGREN
MODULE 1 - 2101
PRETEST

1. What are the three material conditions of readiness?
(Select the letters)

A. WILLIAM
B. ZEBRA
C. YANKEE
D. XRAY
E. RED
F. ZULU
G. YOKE

Your answer is?

Figure 2-6. CII question format.

MODULE TEST COMPLETED

Possible score	49
Passing score	48
Your score	49

CONGRATULATIONS - YOU PASSED

Any required training materials for further study will be printed for you. See your Training Official.

COMMAND?

Figure 2-7. CII completion display when student passes test.

MODULE TEST COMPLETED

Possible score	49
Passing score	48
Your score	45

SORRY - YOU DIDN'T MAKE IT THIS TIME

Any required training materials for further study will be printed for you. See your Training Official.

After studying these materials you may retake the module test.

COMMAND?

Figure 2-8. CII completion display when student fails test.

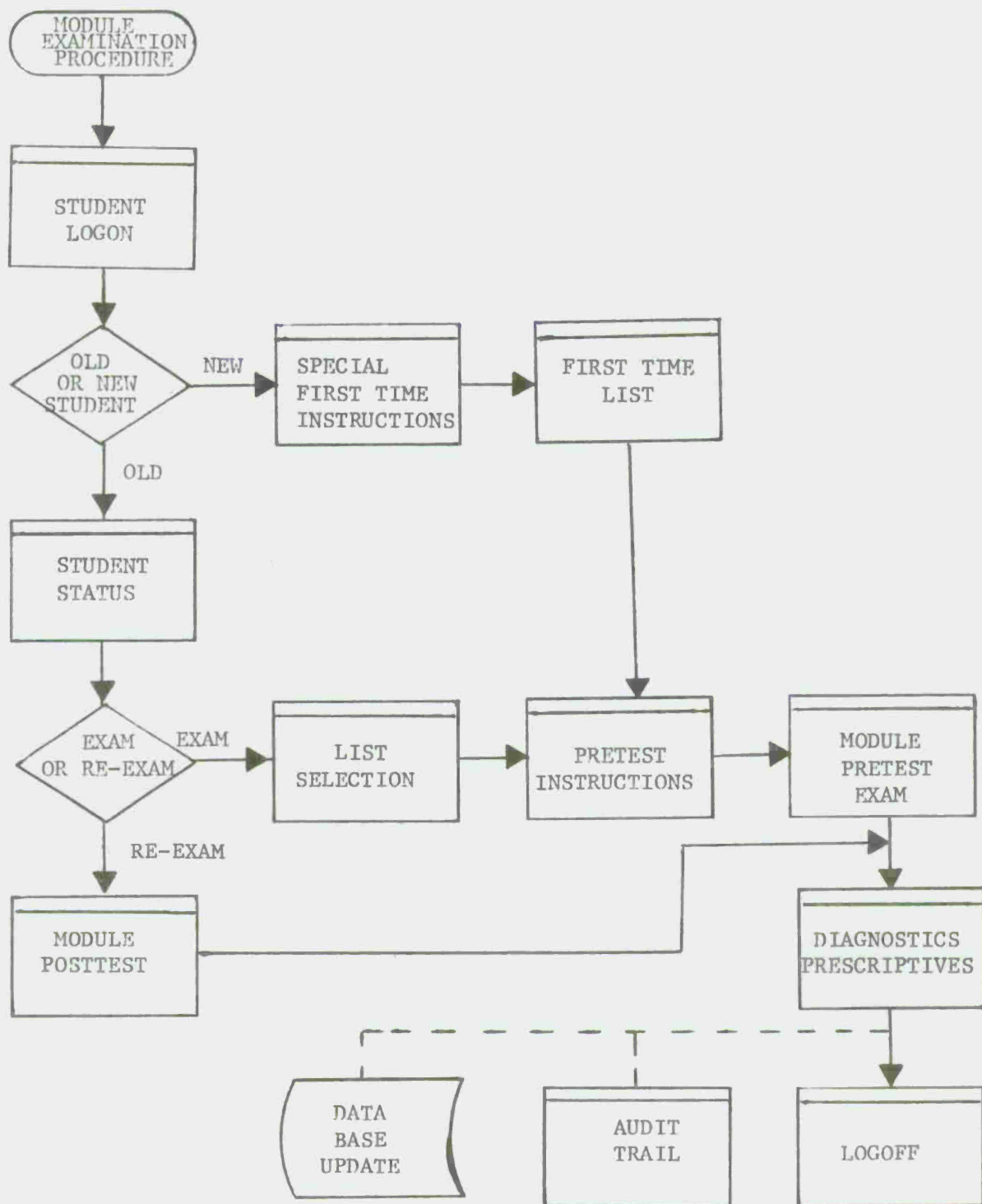


Figure 2-9. CII examination procedure.

When the student feels he has mastered the referenced prescriptive material, he may take the posttest, using the same general procedure he used in taking the pretest. This test may be taken as many times as desired until it is successfully completed. At this time, the student receives credit for the module, unless a practical test is required--i.e., actually operating an equipment. The practical test is administered by a supervisor, and the student's score is input to the data base via teletype by the Training Official. If shipboard conditions do not permit the practical test to be administered, the student may select a new module and proceed with the new pretest. In this manner, he progresses through the CII modules until all are completed. Diagnostic and prescriptive information is available to the student at any time. If he wishes to receive this information, he selects the DISP command to view his record rather than proceeding to the next learning step.

At the end of all CII processing periods, the Training Official copies the updated data base to cassette tape and may delete CII data files from the system. No one can log into CII after this point because there are no data files to recognize user status.

As indicated previously, input to CII is through any of the four CRTs or the teletype. Output is through these remote devices and the line printer. The cassette tapes serve as off-line storage for data files. Although CII has no response time requirements, the overlay structure does minimize waiting between different functions. However, with up to five users having output through one printer, some delay in hardcopy output can be expected. CII is designed to print longer reports at end of processing. The transaction rate depends on the number of users and the type of processing being conducted.

CII input consists of the following:

- Identification - The procedures for logging into CII as a legal student. CII checks the user's SSN against a preset data field.
- Status Display - This relates to the student's ability to request his own status from the data base.
- Examination Answers - The CII's primary output. Answers are input by students in several formats for processing and recording.
- Maintenance - A function of the Training Official. Includes input of system initiation commands, practical exercise scores, data base updates, and system termination commands. Designated personnel can reset student data to reflect GDC segments previously completed, or correct errors in manually input data, such as SSN or student name.

CII output is listed below:

- User Control - These outputs result from the log-in of student user. They identify the user, direct his use and further system input

at the CRT, provide a display of his correct CII status, and direct him to future GDC modules.

- Student Record Display - Output to the student on the CRT upon request. Two hard copies of a similar status report are output on the line printer--one for the student and one for the Training Official.

- Examination Questions - The primary CII output. A separate set of questions is displayed for each GDC module pretest and posttest. One question is displayed at a time and remains displayed until an answer is selected and input by the student. Examination questions are permanently stored on cassette tape and loaded to disk for operation as required.

- Standard Reports - Output on the line printer. The Student Record display and the CII Completion Report (Figure 2-10) are printed automatically by CII. The Statistical Analysis Report (Figure 2-11) is output on user request.

- Audit Trail Information - Implicit in CII functions. At predetermined points in CII processing, audit trail information (e.g., the date/time of an action, the action itself, and the user for whom it was performed) is recorded. It is output to the line printer at the completion of operations, and is used by the Training Official to account for student activity at the CRT terminals (see Figure 2-12), and to monitor his progress through CII.

GENERAL DAMAGE CONTROL CII COURSE COMPLETION 741115	
STUDENT ID	STUDENT NAME
123-45-6789	FRANKLIN D. JONES
234-56-7890	HARRY S. SMITH
345-67-8901	DWIGHT D. DOAKS
456-78-9012	JOHN F. DOWNEY
567-89-0123	LYNDON B. PARKS
678-90-2341	RICHARD M. ROMAN

Figure 2-10. CII Completion Report.

GENERAL DAMAGE CONTROL COMPUTER INTEGRATED INSTRUCTION EXAMINATION STATISTICS												
EXAMINATION FOR MODULE-3						TAKEN 2 TIMES		PERCENTAGES ARE FOR RIGHT ANSWERS				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
100%	100%	100%	50%	100%	0%	100%	100%	100%	100%	50%	100%	0%

Figure 2-11. Statistical analysis of CII examinations.

USS DAHLGREN DLG 12
GENERAL DAMAGE CONTROL
COMPUTER INTEGRATED INSTRUCTION
AUDIT TRAIL

741020	09.06.57	123-45-6789	LOGGED IN
741020	09.06.59	123-45-6789	CII INITIATED
741020	09.07.56	180-36-0715	INITIALIZED OR CHANGED
741020	09.08.39	180-36-0715	LOGGED IN
741020	09.12.42	170-36-0715	TOOK PRETEST 5
741020	09.15.05	170-36-0715	LOGGED OUT
741020	09.15.24	180-36-0715	POINTS ADDED OR SUBTRACTED
741020	09.16.22	170-36-0715	POINTS ADDED OR SUBTRACTED
741020	09.17.07	170-36-0715	LOGGED IN
741020	09.18.16	180-36-0715	TOOK PRETEST 1
741020	09.19.51	170-36-0715	LOGGED IN
741020	09.25.56	170-36-0715	TOOK POSTTEST 1
741020	09.28.20	170-36-0715	LOGGED OUT
741020	09.30.17	180-36-0715	POINTS ADDED OR SUBTRACTED
741020	09.31.39	180-36-0715	POINTS ADDED OR SUBTRACTED
741020	09.32.19	180-36-0715	LOGGED IN
741020	09.34.17	170-36-0715	TOOK PRETEST 7
741020	09.35.32	170-36-0715	LOGGED OUT
741020	09.35.58	170-36-0715	LOGGED IN
741020	09.37.07	170-36-0715	TOOK PRETEST 6
741020	09.38.46	170-36-0715	TOOK PRETEST 2
741020	09.40.31	170-36-0715	TOOK PRETEST 3
741020	09.42.35	180-36-0715	TOOK PRETEST 4
741020	09.56.47	170-36-0715	LOGGED IN
741020	09.57.40	170-36-0715	LOGGED OUT
741020	09.58.09	180-36-0715	POINTS ADDED OR SUBTRACTED
741020	09.59.03	170-36-0715	POINTS ADDED OR SUBTRACTED
741020	10.00.07	170-36-0715	POINTS ADDED OR SUBTRACTED
741020	10.02.16	180-36-0715	LOGGED IN
741020	10.03.06	180-36-0715	LOGGED OUT
741020	10.03.20	123-45-6789	CII TERMINATED

Figure 2-12. CII audit trail.

2.5 ADP Documentation. The ADP documentation for shipboard CII aboard DAHLGREN consists of the following (see references):

- Functional Description, FD-02A
- Users Manual, UM-02
- Computer Operation Manual, OM-02
- Program Maintenance Manual, MM-02
- Test and Implementation Plan, PT-02

SECTION 3. CII COURSEWARE DESIGN AND DEVELOPMENT

The Personnel Qualification Standard for Damage Control, Qualification Section 2, General Damage Control (PQS 2) (NAVEDTRA 43119-2A) describes the skills and knowledges required for General Damage Control. PQS 2 consists of 15 sections or areas--4 on theory, 10 on systems, and 1 on watch-stations.

The objective was to develop approximately 30 hours of computer integrated instruction, including 6 hours of on-line tests, to assist students in meeting the requirements in PQS 2. The CII courseware development steps are shown in Figure 3-1 and are described in the following paragraphs.

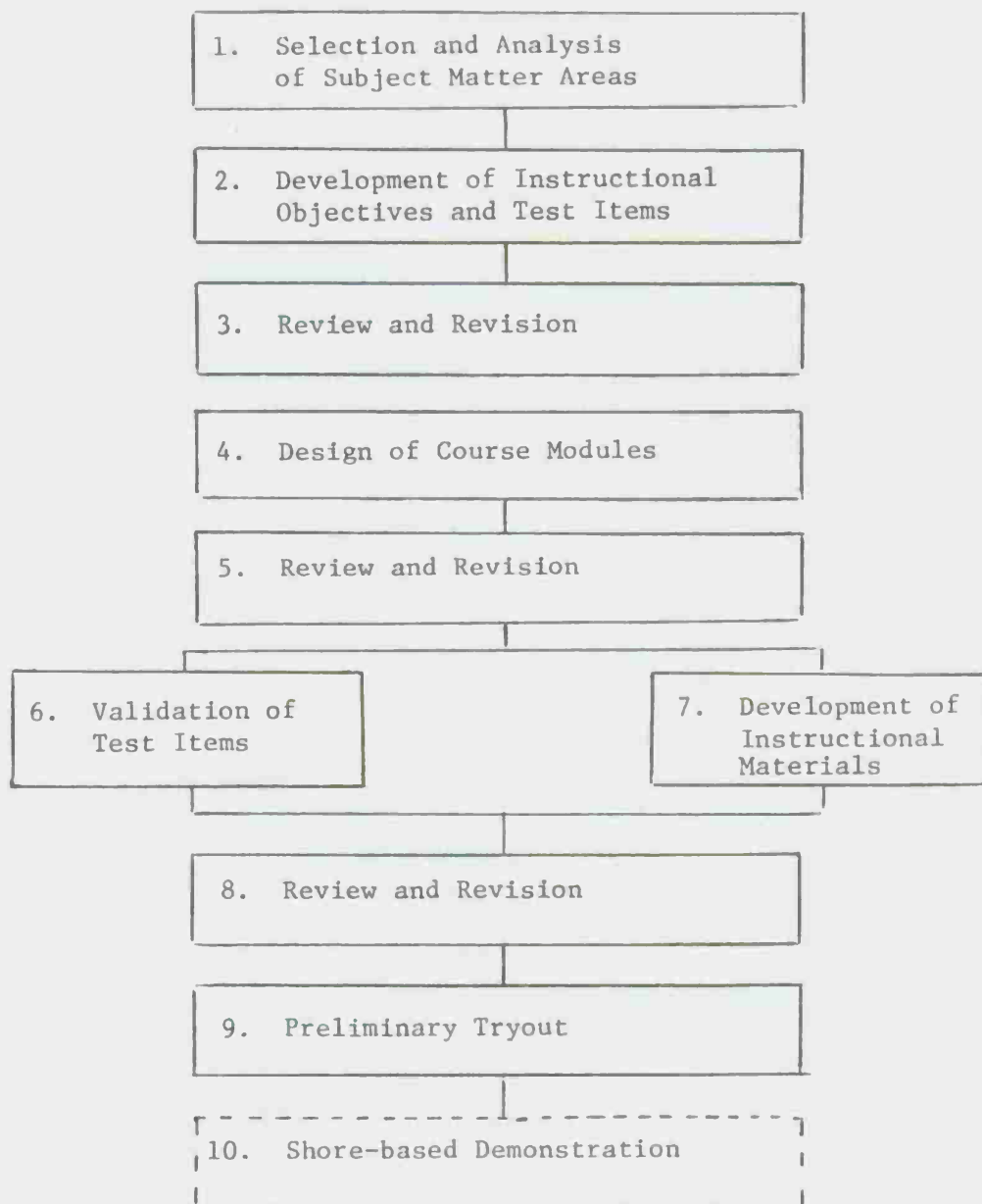


Figure 3-1. CII courseware development steps.

3.1 Selection and Analysis of Subject Matter Areas (Step 1).

3.1.1 Selection of Subject Matter Areas. The GDC sections or areas contained in PQS 2 were analyzed to determine which could be most readily adapted to individualized instruction*. The stated skills and knowledges required for each section were analyzed to determine which (1) were most truly representative of GDC, (2) could be converted into learning objectives that could be clustered into independent modules and lessons, and (3) merited the most/least instructional time. The publications associated with each section were also reviewed. These publications are listed in the bibliography. Finally, discussions were held with personnel from the PQS Development Group, Naval Training Center, San Diego; the Fleet Training Center (FLETRACEN) Damage Control and Firefighting School, San Diego; COMNAVSURFLANT, USS KING, and NAVPERSRANDCEN. As a result of this analysis, the following eight areas were selected to provide a prototype CII system:

<u>PQS Number</u>	<u>Subject Area</u>
2101	Damage Control Theory
2102	Nuclear, Biological, and Chemical (NBC) Theory
2104	Safety Precautions
2203	Firemain System
2206	Fixed Damage Control Equipment System
2207	Portable Damage Control Equipment System
2208	Personnel Protective Equipment System
2210	Oxygen Breathing Apparatus (OBA) System

The above sections were then further analyzed to determine whether they contained performance-oriented tasks that (1) were amenable to individualized instruction, (2) had clear "start" and "end" points, (3) could be practically accomplished aboard ship under nonbattle or emergency conditions, and (4) were representative of GDC requirements aboard DAHLGREN. As a result, the following tasks were selected as the initial subject matter areas for CII development:

<u>PQS 2 Number</u>	<u>Subject Area</u>
2101.2	Compartmentation and Watertight Integrity
2101.4	Battle Damage Types
2101.5	Battle Damage Repair
2102.18	NBC Defense - Self-protection Measures
2207.27	CO ₂ Fire Extinguisher
2208.24	Mark IV Protective Mask
2208.29	Casualty Dosimeter (DT-60/PD)
2208.210	Pocket Dosimeter
2208.211	Film Badge
2210	Oxygen Breathing Apparatus (OBA) System

*PQS 2 as set forth in NAVTRA 43119-2 was in effect when SDC began this initial analysis. Changes made to PQS 2 by NAVEDTRA 43119-2A did not affect the project.

3.1.2 Analysis of Subject Matter Areas. Training Analysis Information Sheets (TAIS) were prepared for each selected subject matter area by (1) analyzing Navy publications and documents, FLETRACEN Damage Control and Firefighting School lesson plans, PQS 2, and target population skills and knowledges, (2) holding discussions with Navy experts on subject matters, and (3) interacting of instructional writers with actual equipment (e.g., the ND Mark V Protective Mask and OBA). A representative TAIS is shown in Figure 3-2. The complete set of TAISs prepared for the project is contained in Computer integrated instruction general damage control learning objectives (NAVPERSRANDCEN TN-01 and TN-01A).

TAIS NO. <u>2301</u>		MODULE <u>CII-PPE</u>	
		UNIT <u>DT-60</u>	
TRAINING ANALYSIS INFORMATION SHEET			
1. TASK IDENTIFICATION: 1.0			
2. TASK: State the purpose of the DT-60/PD casualty dosimeter.			
3. CONDITIONS: Given multiple-choice test items concerning the purpose of the DT-60/PD casualty dosimeter, provide correct response.			
4. STANDARD: No errors.			
5. TASK ANALYSIS:			
TASK ELEMENTS	PREREQUISITE KNOWLEDGE OR SKILL REQUIREMENTS	SUPPLEMENTAL TRAINING MATERIAL	REFERENCES
1.1 State measures total dose of gamma rays received by a person	1.1 Know definition of dose and general nuclear terminology	None	1. NAVPERS 10054-C, Chapter 12, Pages 189-191 2. NAVTRA 10573, Chapter 25, Pages 611-612 3. NAVPERS 10571-F, Chapter 16, Pages 242-244 4. NAVPERS 10899-B, Chapter 6, Pages 120-122 5. NWIP 50-3, Chapter 6, Pages 6-12--6-14

Figure 3-2. TAIS for the casualty dosimeter.

3.2 Development of Instructional Objectives and Test Items (Step 2).

3.2.1 Development of Instructional Objectives. Instructional objectives serve as a base from which instructional material is developed. Also, they lead directly to the development of test items.

Two types of instructional objectives were developed: (1) criterion and (2) enabling. Criterion objectives are end objectives associated with a specific task, with each specifying the type of behavior required. Such objectives were developed for each task element specified in the TAIS. Enabling objectives are sub-objectives; they represent a skill or knowledge necessary to perform a given task successfully. These objectives were developed as required to indicate the knowledge and skills needed to master the criterion objectives.

Figure 3-3 shows a sample criterion and enabling objectives worksheet. A complete set of criterion and enabling objectives for the CII curriculum is contained in TN-01 and TN-01A.

TAIS NO. <u>2301</u>		MODULE <u>CII-PPE</u>
		UNIT <u>DT-60</u>
CRITERION AND ENABLING OBJECTIVES		
TASK IDENTIFICATION: 1.0		
TASK ELEMENTS: 1.1		
CRITERION OBJECTIVE(S)	ENABLING OBJECTIVE(S)	
1.1 The student is able to state the purpose of the DT-60/PD casualty dosimeter as being: TO MEASURE TOTAL DOSE OF GAMMA RAYS RECEIVED BY A PERSON.	1.1.1 Fill in gamma rays as being the type of radiation that the DT-60/PD casualty dosimeter is designed to measure.	

Figure 3-3. Criterion and enabling objectives for casualty dosimeter.

3.2.2 Development of Test Items. Test items are used to indicate how well the student is mastering the various instructional segments. There are two types of test items--criterion and enabling--that are keyed directly to the criterion and enabling objectives.

The following guidelines were adopted to aid in specifying the test items:

- Test items must be performance-oriented and require the student to demonstrate skills and knowledge directly related to the criterion objectives.
- Each test item must elicit measurable behavior.
- The structure of the test item must be positively oriented.
- Multiple-choice items must have at least four alternatives.
- The test item must be amenable to CRT presentation or CRT presentation plus a simple off-line exhibit.

Figure 3-4 shows a sample test items worksheet. Correct answers to test items are shown in two ways:

- Constructed response answers are enclosed within parentheses and underlined. Alternative responses may be included along with the correct response but are not underlined. For example, (Open/Closed) indicates "closed" is the correct response.
- An asterisk (*) precedes the correct alternative for multiple-choice test items.

TN-01 and TN-01A contain a complete set of criterion and enabling test items for the CII curriculum.

TAIS NO. 2301

MODULE CII-PPE

UNIT DT-60

TEST ITEMS

TASK IDENTIFICATION: 1.0

TASK ELEMENTS: 1.1

CRITERION ITEM(S)	ENABLING ITEM(S)
1.1 The purpose of the DT-60/PD casualty dosimeter is to measure: a. The rate of radiation received by an individual *b. The total dose of gamma rays received by an individual c. The amount of gamma rays received during a 30-day period. d. The number of times a person has been X-rayed	1.1.1 The DT-60/PD casualty dosimeter is designed to measure: a. Alpha rays b. Zulu rays *c. Gamma rays d. Electrical ions

Figure 3-4. Test items for the casualty dosimeter.

3.3 Review and Revision (Step 3). The developed Training Analysis Information Sheets, objectives, and test items were subjected to an extensive review by subject matter experts from the FLETRACEN Damage Control and Firefighting School. The material, along with experts' comments and recommendations, was then submitted for further review by representatives of NAVPERSR-ANDCEN, COMNAVSURFLANT, DAHLGREN, and CNO (OP-91).

The consensus was that CII material should be developed for additional damage control topics specified in PQS 2. In order to include additional topics, while still maintaining the previously targeted number of instructional hours (30), it was decided to delete some topics from further courseware development and to combine similar topics to form a single lesson.

Table 3-1 is the revised list of subject areas selected for CII development. Two of the initial topics (NBC Defense - Self-protection Measures (2102.18) and Film Badge (2208.211)) are no longer included. The additional topics were subjected to the same developmental steps described previously.

Similar topics, such as the CO₂ Fire Extinguisher (2207.27) and the Dry Chemical Extinguisher (2207.28), were combined to form a single lesson. The completed materials for the additional topics were incorporated into TN-01A which, when combined with TN-01, comprises the instructional objectives for the CII courseware.

TABLE 3-1

Revision to Subject Areas Selected for CII Development

PQS Number	Subject Area
*2101.2	Compartmentation and Watertight Integrity
2101.3	Fire and Firefighting
2101.4	Battle Damage Types
*2101.5	Battle Damage Repair
2102.1	Nuclear Defense Theory
2102.2	Biological Defense Theory
2102.3	Chemical Defense Theory
2104.1	Safety Precautions Theory
2203.25-26	Magazine Sprinkler System
2203.27-28	Water Washdown System
2206.21	Fixed CO ₂ System
2206.26	Twin Agent System (AFFF and PKP)
2207.21	Firehose
2207.22	All-purpose Nozzle
2207.23	Low-velocity Fog Applicator
2207.24	Portable Water Motor Proportioner (FP-180)
2207.25	Navy Pickup Unit (NPU) Nozzle
2207.26	Foam Nozzles
*2207.27	CO ₂ Fire Extinguisher
2207.28	Dry Chemical (PKP/ABC) Extinguisher
2207.29	P-250 Internal Combustion Engine Pump
2207.210	Electric Submersible Pump
2207.211	Eductors (Peri or Single Jet)
2207.212	Portable Electric Blower
2207.213	Portable Pneumatic Blower
2207.214	Flood and Battle Lanterns
2207.215	Eductor Discharge Hose
2208.21	Proximity Suit and Gloves
2208.22	Impregnated (Permeable) Protective Clothing
*2208.24	Mark V Protective Mask
2208.28	CO ₂ Inflatable Lifejacket
*2208.29	Casualty Dosimeter (DT-60/PD)
*2208.210	Pocket Dosimeter (IM-143/PD)
*2210	Oxygen Breathing Apparatus (OBA) System

*Retained from the initial subject matter areas selected for CII development.

3.4 Design of Course Modules (Step 4 in Figure 3-1). The design of course modules was completed with the submission of Computer integrated instruction general damage control module specifications (NAVPERSRANDCEN TN-02 of April 1974). This document describes the CII GDC curriculum, including the organization of each course module. An overview of the CII courseware organization appears in Figure 3-5.

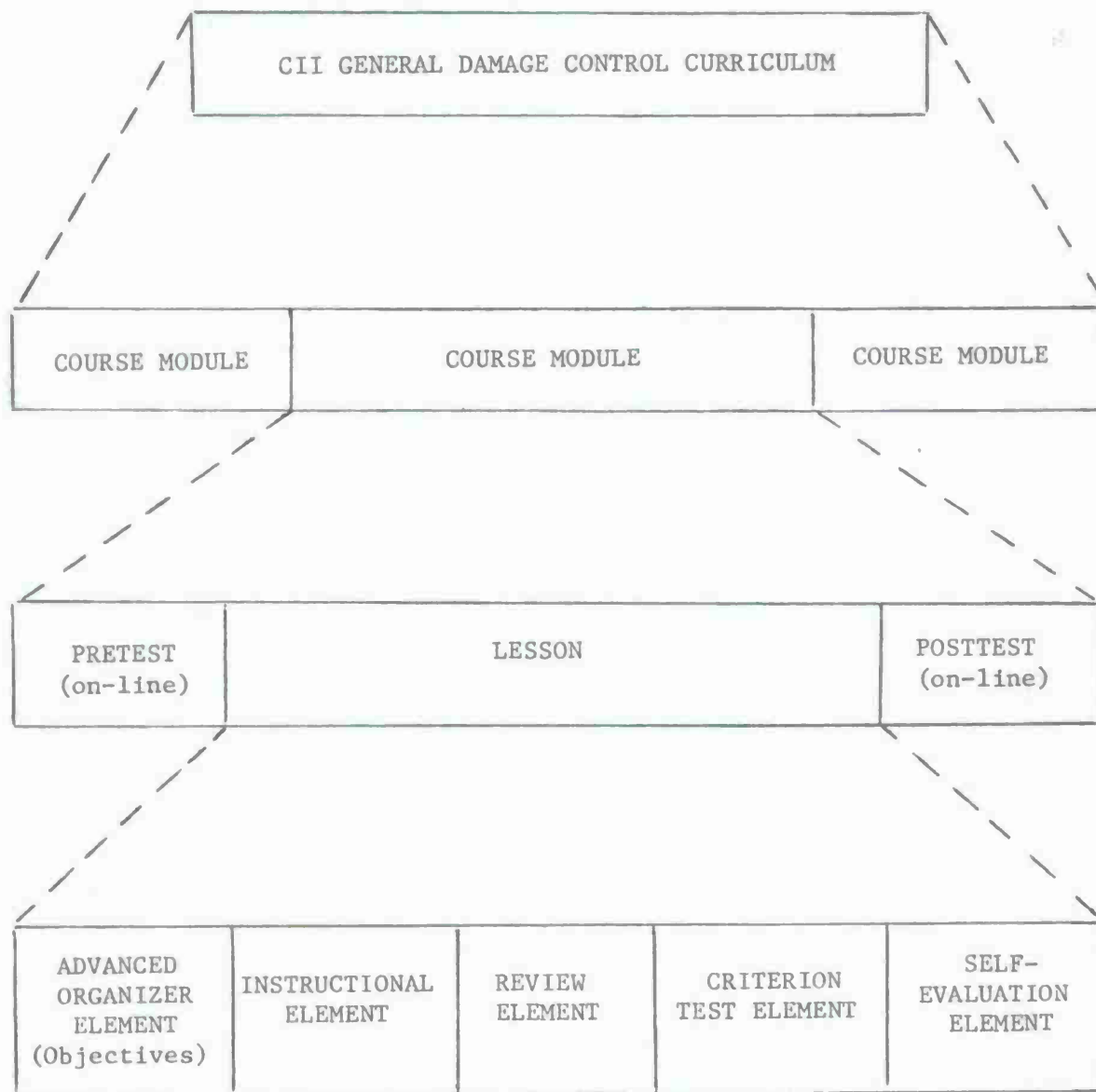


Figure 3-5. CII courseware organization.

The major block of instruction is the course module, which consists of three parts--the pretest, the lesson itself, and the posttest. The pretest is administered on line and is designed to allow the student to skip lessons within a course module when mastery of a skill or knowledge is indicated. The lesson is designed to enable the student to attain specific knowledge and/or skills. Finally, the posttest, also administered on line, provides the student with immediate feedback with respect to his mastery of course module subject matter. If results indicate he has mastered the subject, he is directed either to proceed to the next module or take a practical test if required. If results indicate he has not mastered the material, he is directed to appropriate review material.

The lessons are self-contained instructional units that are administered off line in the form of (1) programmed instruction (PI) booklets, (2) audiovisual (A/V) slide-sound tape materials, (3) audio (A) tapes, or (4) self-study guide (SSG) booklets. They are comprised of the following five elements (see Figure 3-5):

- Advanced Organizer Element - Introduces the student to the subject matter within the lesson and states the objectives to be accomplished.
- Instructional Element - Provides the instruction to enable the student to meet criterion established for the instructional element.
- Review Element - Permits the student to review previously studied materials if he desires. The topics within the lesson are listed, and their locations within the lesson are indicated for easy access.
- Criterion Test Element - Test the student's mastery of the learning objectives established for the instructional element. A scoring key permits the student to score his own criterion test.
- Self-Evaluation Element - Enables student to evaluate his lesson test results and to determine if he is prepared for the on-line module test.

Detailed lesson outlines are found in TN-02.

3.5 Review and Revision (Step 5 in Figure 3-1). In April 1974 representatives from NAVPERSRANDCEN, COMNAVSURFLANT, DAHLGREN, and CNO reviewed TN-02. In general, the number of comments were minimal. Suggested changes dealt primarily with delineating more closely the relation between TN-02 and PQS 2.

3.6 Validation of Test Items (Step 6) of Figure 3-1. Two test item validations were conducted (in August and September 1974) to obtain opinions of subject matter experts and item analysis data for appropriate revision and improvement.

3.6.1 First Validation

3.6.1.1 Preparation. Test items representative of each module were selected to form seven module tests*. The number of test items selected for each module are indicated below:

<u>PQS Module*</u>	<u>Number of Test Items</u>
2101	82
2102	18
2104	14
2206	70
2207	80
2208	60
2210	62

All test items were prepared in hardcopy to be presented off line in the format expected for the CRT display aboard DAHLGREN. This technique not only provided quality control of the test items but also allowed changes to be incorporated in the tests for subsequent validation.

For each test item, a header was prepared consisting of (1) the test item number (test items were numbered sequentially within each module), (2) a mnemonic formed from the TAIS number and the corresponding criterion or enabling objective number, and (3) the PQS module identifier. For example, the header for the 40th test items representing criterion objective 3 of TAIS 5307 in module test 2206 would be:

40 5307.3 2206

A space was provided under each test item for the subject to enter his answer. A sample test items sheet is shown in Figure 3-6.

A scoring key for each module test was also produced as a listing from keypunched card decks, photographs and diagrams associated with specific test items that could not be displayed via CRT were provided as handouts (see Figure 3-7).

*As indicated previously, eight PQS modules had been selected for CII instruction. However, at the time of these validations, items representative of PQS 2203 were included as part of the module test for PQS 2206. A separate test for PQS 2203 was later developed to conform with the revised PQS requirements in NAVEDTRA 43119-2A.

23 5304.1.2 2206

IF THE PRESSURE IN THE NITROGEN CYLINDER IS EXHAUSTED (DROPS TO ZERO) WHILE FIGHTING THE FIRE, THE EFFECT ON THE LIGHT WATER (AFFF) PORTION OF THE TWIN AGENT UNIT WILL BE WHICH OF THE FOLLOWING:

- A. 3 WAY GATE VALVE WILL CLOSE
- B. NO EFFECT ON LIGHT WATER PORTION
- C. HYTROL VALVE WILL CLOSE SHUTTING OFF WATER SUPPLY
- D. MANUAL CONTROL VALVE WILL CLOSE

YOUR ANSWER: _____

24 5304.1.3 2206

YOU ARE FIGHTING THE FIRE AND THE LIGHT WATER AGENT IN THE AFFF CONCENTRATE TANK RUNS OUT. WHAT IS THE EFFECT ON THE LIGHT WATER PORTION OF THE TAU?

- A. WATER PRESSURE AND WATER SUPPLY WILL BE MAINTAINED
- B. HYTROL VALVE WILL CLOSE SHUTTING OFF WATER SUPPLY
- C. POWERROL VALVE WILL CLOSE SHUTTING OFF WATER SUPPLY
- D. PKP SUPPLY WILL BE SHUT OFF

YOUR ANSWER: _____

25 5304.2 2206

YOU ARE ON THE DAMAGE CONTROL DECK WHEN A CLASS B FIRE BREAKS OUT. THE CHIEF TELLS YOU TO ACTIVATE (FIRE) THE AFFF SINGLE HOSE REEL PORTION OF THE TWIN AGENT UNIT WHICH IS THERE. FROM THE LIST OF STEPS GIVEN BELOW, FIRST SELECT WHAT PROCEDURAL STEPS ARE REQUIRED AND THEN PLACE THEM IN THE PROPER ORDER (PLACE LETTERS SELECTED IN THE PROPER ORDER).

- A. OPEN THE BALL VALVE IN THE AFFF PIPING AT THE SINGLE HOSE REEL
- B. TURN HYTROL VALVE TO THE OPEN POSITION
- C. TURN MANUAL CONTROL VALVE TO THE OPEN POSITION
- D. TURN POWERROL VALVE TO THE OPEN POSITION

YOUR ANSWER: _____

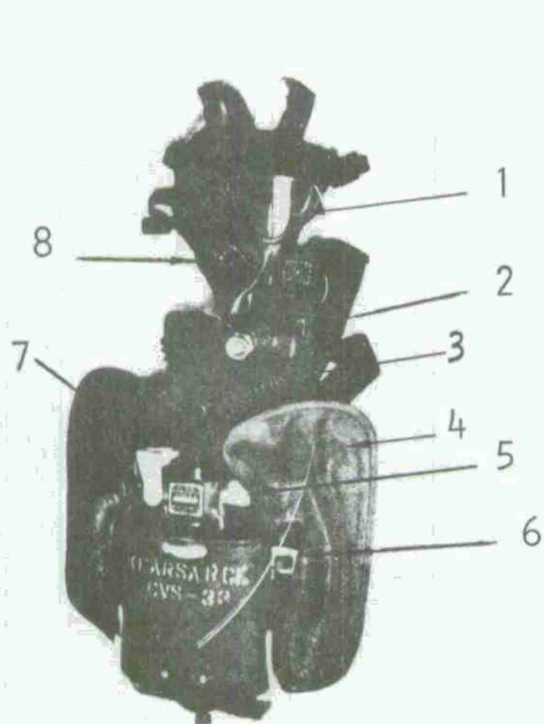
26 5304.3 2206

IN ORDER TO UNREEL THE HOSE FROM THE TWIN AGENT UNIT HOSE REEL IT IS NECESSARY TO DO WHICH ONE OF THE FOLLOWING:

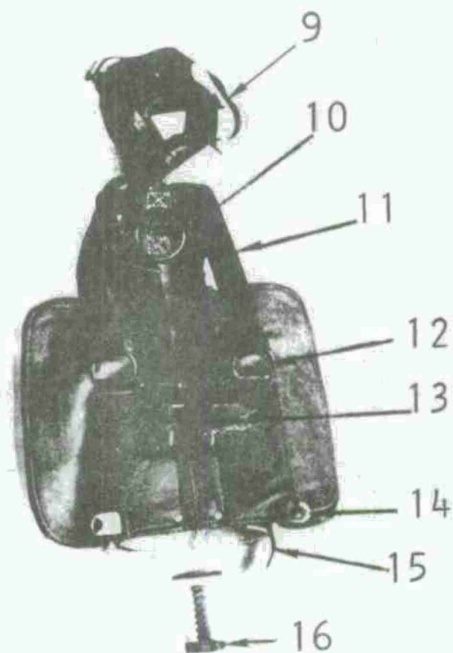
- A. LOOSEN THE FRICTION BRAKE HANDWHEEL
- B. ACTIVATE (FIRE) THE TWIN AGENT UNIT
- C. RELEASE THE CLUTCH TO THE "ON" POSITION
- D. USE THE HAND CRANK TO TURN THE REEL

YOUR ANSWER: _____

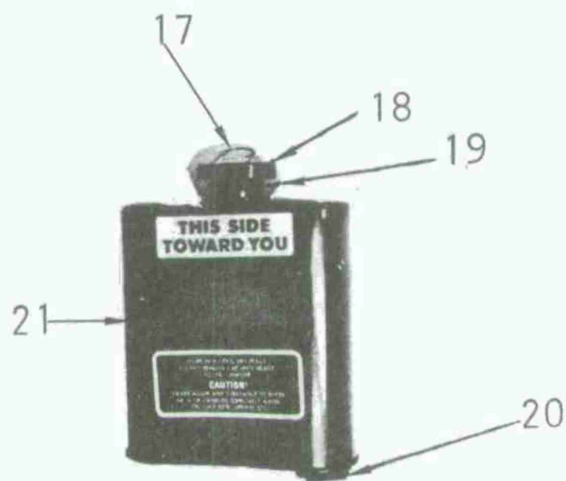
Figure 3-6. Sample test item sheet.



OBA - Front View



OBA - Rear View



OBA Canister

Figure 3-7. Sample exhibit for Module Test 8 (PQS 2210).

3.6.1.2 Subjects. Subjects included 28 subject matter experts (27 instructors from the FLETRACEN Firefighting School and one from the Damage Control School) and 30 novices (personnel who had recently completed boot camp and were currently assigned to FLETRACEN awaiting further assignment). Background data on the subjects appear in Table 3-2.

TABLE 3-2

Subject Background Data for August Validation

Subjects	Average Pay Grade	Average Highest School Grade	Average GCT Score
Experts	6.4 n = 27*	11.6 n = 28	51.6 n = 18*
Novices	1.9 n = 28*	10.8 n = 27*	40.7 n = 24*

*Some subjects did not report all data requested

3.6.1.3 Method. Subjects required four to five hours to complete the battery of tests. No time limit was imposed, and breaks were at the option of the student. Expert subjects completed the tests in one day. They were given the tests in groups of five or six over a five-day period. Novice subjects were tested as a group over a two-day period.

Subjects were briefed as to the purpose of the project, and asked to complete the CII Questionnaire (see Figure 3-8). The CII module tests were then administered. Handouts containing photographs and diagrams associated with specific test items were issued as appropriate. Students were encouraged to mark any test item which they felt should be reviewed for clarity or technical content.

After the tests were completed, expert subjects were interviewed. Any suggested revisions were incorporated into the tests before the next group of experts was tested.

CII QUESTIONNAIRE

Date _____

Name _____ SS Number _____

Pay Grade _____ Time in Grade _____ Phone Number _____

Rating _____ Date of Birth _____ Education _____

Job Title _____ Phone Number _____

Organization _____

Length of Service _____ GCT Score _____

Damage Control and Fire Fighting Schools Attended:

1. Course _____

Date _____ Location _____

2. Course _____

Date _____ Location _____

3. Course _____

Date _____ Location _____

Damage Control and Fire Fighting Experience:

1. Job Title _____

Duties _____

Location _____ Date: From _____ To _____

2. Job Title _____

Duties _____

Location _____ Date: From _____ To _____

(Please put additional schools or experience on back of sheet)

Figure 3-8. CII Questionnaire.

3.6.1.4 Results. Results are shown in Table 3-3 and Figure 3-9. The experts scored primarily in the 70 to 80 percentile range as compared to 30 to 40 for the novices. As might be expected, the experts' scores show more variability than those of the novices. The experts scored lowest in PQS 2104 (Safety Precautions) module test, while the novices scored highest in this area.

TABLE 3-3
Results of August Validation

	<u>PQS Number</u>						
	2101	2102	2104	2206	2207	2208	2210
Total Items	82	18	14	70	80	60	62
Expert Mean Score	63	16	9	52	64	42	47
Expert Percent Correct	77	89	64	74	80	70	76
Expert Range of Scores	54-72	12-17	7-12	31-66	56-73	29-53	37-55
Novice Mean Score	33	8	7	30	32	22	25
Novice Percent Correct	40	44	50	43	40	37	40
Novice Range of Scores	17-58	3-15	4-14	11-35	6-50	11-38	7-50

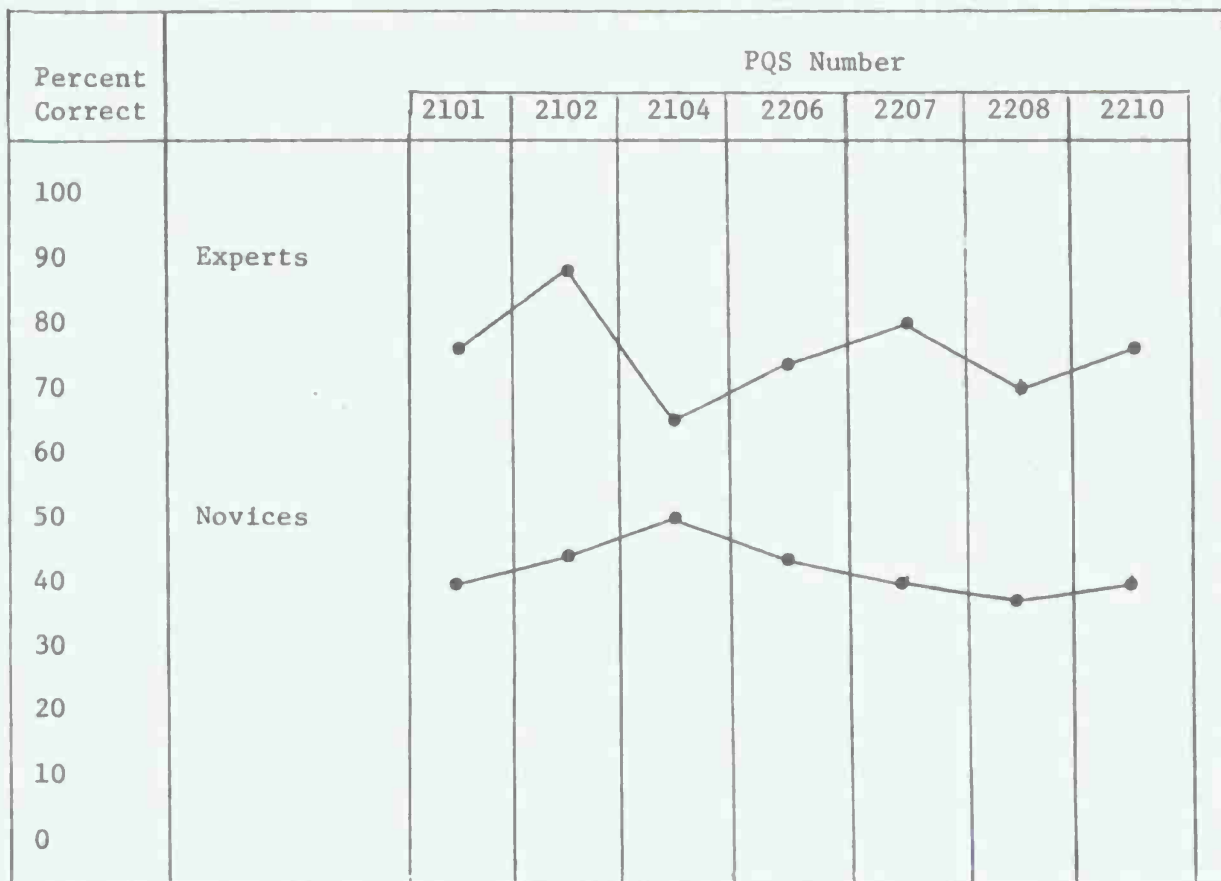


Figure 3-9. Comparison of expert and novice test results - August validation.

Minor revisions were made to the test items as a result of the validation, particularly those suggested by expert subjects. For instance, they suggested format changes to test items containing procedures presented in a scrambled order. These items were revised to present the same data but in a direct multiple-choice format. Scoring keys were also compared with expert subject responses to ensure correctness and to eliminate ambiguity.

3.6.2 Second Validation.

3.6.2.1 Preparation. Modifications were made to the test item card decks and new listings obtained. PQS 2102 was expanded from 18 to 38 test items to provide more complete coverage. One item was added to 2101 and three were added to 2104. One item was deleted from 2206 and three were deleted from 2210. Thus, the number of test items used for the cross validation was as follows:

<u>PQS</u>	<u>Test Items</u>
2101	83
2102	38
2104	17
2206	69
2207	80
2208	60
2210	59

Updated scoring keys were produced as required, and CII Test Exhibit handouts were changed to enhance clarity and remove ambiguities.

3.6.2.2 Subjects. The cross-validation sample consisted of a new group of 10 experts and 10 novices from FLETRACEN. The 10 experts included five Damage Control School instructors, three welder instructors, one Hull Technician, and one Operations Specialist. Novices were personnel currently assigned to FLETRACEN and awaiting further assignment. Background data appears in Table 3-4.

TABLE 3-4

Subject Background Data for September Validation

Subjects	Mean Pay Grade	Mean Highest School Grade	Mean GCT Score
Experts	6 n = 8*	11.9 n = 10	47.7 n = 6*
Novices	2 n = 9*	10.1 n = 10	42.5 n = 8*

*Some subjects did not report all data requested or data was not available.

3.6.2.3 Method. The procedures used for this cross validation were the same as those used for the August validation. Subjects were briefed as to the purpose of the project, filled out the CII Questionnaire, and took the seven revised CII module tests. Again, no time limit was imposed and breaks were at the option of the subjects. Subjects were encouraged to mark test items which they felt should be reviewed for clarity or technical content.

3.6.2.4 Results. Results are shown in Table 3-5 and Figure 3-10. Experts' scores were primarily in the 60 to 80 percentage range, which was 20 to 29 percentage points higher than those of the novices. The lowest percentage score--for both the experts and the novices--was on the test module for PQS 2206, Fixed Damage Control Equipment. This module contains a large

number of questions on the Twin Agent System, a firefighting system on DAHLGREN. This equipment is apparently unfamiliar both to damage control instructors and personnel not normally concerned with firefighting techniques.

TABLE 3-5
Results of September Validation

	PQS Module and Total Items						
	2101	2102	2104	2206	2207	2208	2210
	82	38	17	69	80	60	59
Expert Mean Score (N = 10)	63	30	12	41	60	42	39
Expert Percent Correct (N = 10)	76	80	73	60	75	69	66
Expert Percent Correct (N = 9)*	81	82	76	63	78	73	71
Expert Percent Correct (N = 5)*	87	89	80	65	84	80	72
Novice Mean Score	40	19	10	25	44	29	24
Novice Percent Correct	49	51	56	36	55	48	41

*N = 9, one operations specialist deleted.

*N = 5, Damage Control instructors only.

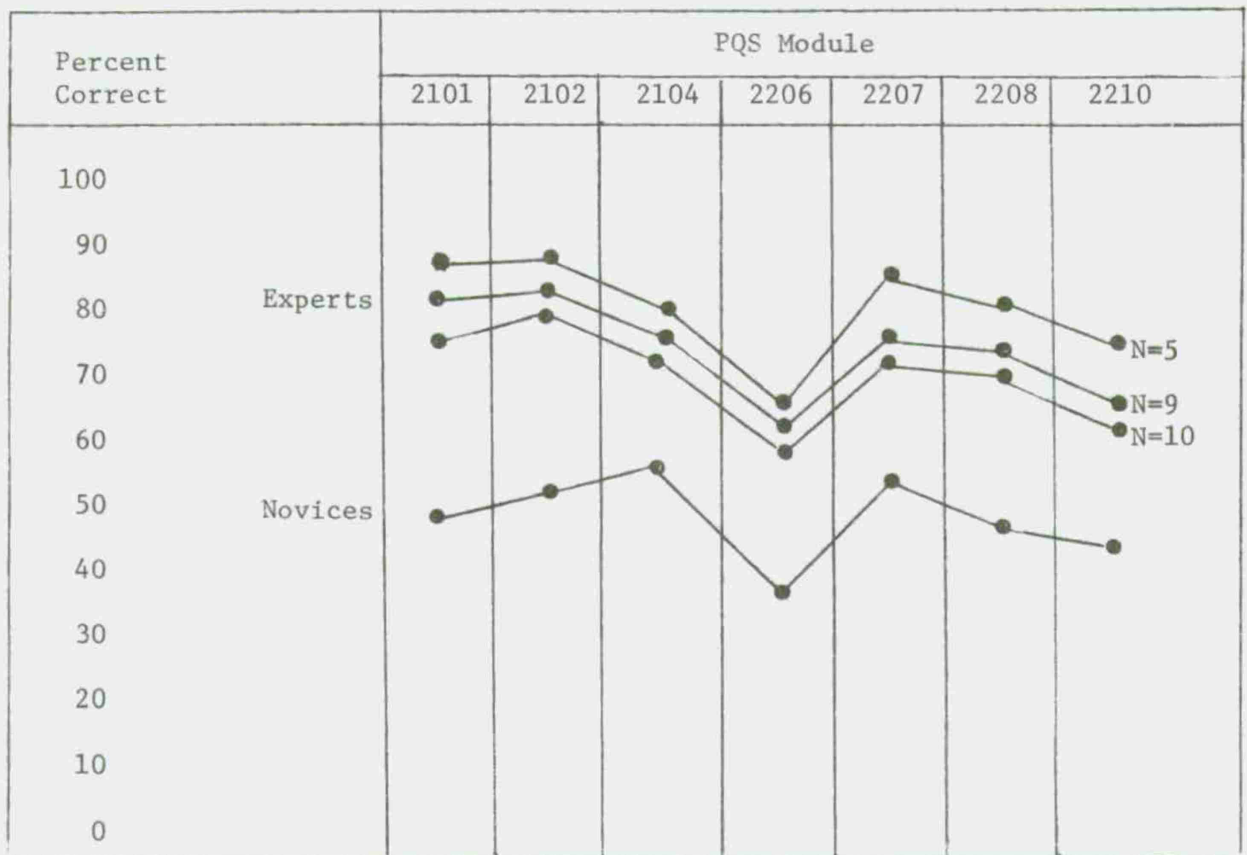


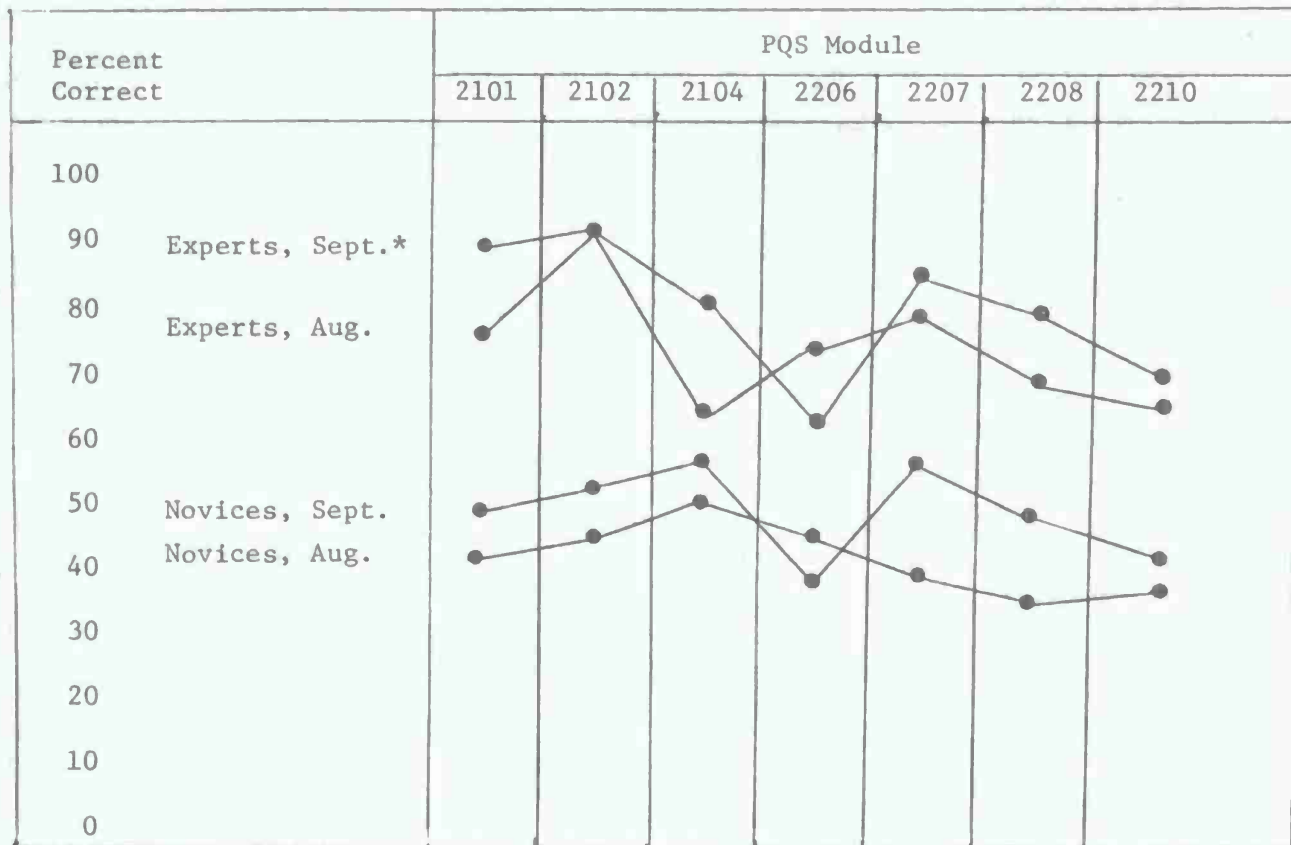
Figure 3-10. Comparison of expert and novice test results--September validation.

As indicated in Table 3-5 and Figure 3-10, the novices scored highest in PQS 2104, Safety Precautions, as they did in the August validation. This group of experts scored nine percentage points higher. The highest expert percentage score appears for PQS 2102, NBC Theory, a topic that receives considerable emphasis at the Damage Control School.

The overall results indicate that the revised module tests did discriminate. However, because the experts selected for this test validation were from several specialty areas, the scores obtained by the five damage control instructors might have been unduly suppressed by those obtained by experts in other areas. The ability of the tests to discriminate between damage control experts and novices may not be accurately represented. The operations specialist expert scored the lowest of all experts for all tests, although his scores were well within the range of scores obtained by the novices. He had the lowest score (7) for PQS 2104 and the second-lowest score (15) for PQS 2210. When this subject's scores were excluded from the analysis, the mean percentage scores for experts were raised. When only the test scores obtained by the five damage control instructors (who scored highest in all tests) were included, the mean percentile scores were increased by as much as 11 points (2101 and 2208). This suggests that

instructors in damage control are more familiar with the topics emphasized in these particular CII tests than experts in related specialties.

A comparison of the August and September test validations is shown in Figure 3-11. The scores of the experts (N = 5) from the Damage Control School who participated in September are higher than those obtained by the experts from the Firefighting School who participated in August. The differences can probably be attributed to different "expert" groups, and the emphasis placed on different damage control topics in each school.



*N=5 Damage Control Instructors

Figure 3-11. Comparison of August and September validations.

Novices generally scored higher in the September test validation. This may reflect the changes made to procedure-type items which made them easier, or merely the differences between the two novice groups.

The highest novice percentage score (56) is still well below the proposed criterion score (80 percent). As previously indicated, the highest novice score in both validations occurred for PQS 2104, Safety Precautions.

3.7 Development of Instructional Materials (Step 7 in Figure 3-1). The development of CII materials followed review of the module specifications (Step 5).

3.7.1 Programmed Instruction (PI). PI is individualized instruction that presents material in a planned sequence. This method provides immediate feedback to the student, permits him to proceed at his own pace, and requires maximum student participation.

A task, as specified in the TAIS, became the basic instruction production unit. After the TAIS, criterion and enabling objectives and test item worksheets for each task were reviewed, the design of each course module was examined. An instructional sequence, which proceeded from one criterion objective to the next, with the enabling objectives appropriately embedded, was then determined for each task.

A series of frames was prepared in conjunction with each enabling or criterion test item in the lesson sequence. Each frame was designed to perform one or more of the following:

- Present procedures, content information, examples, test items, or instructions to the student.
- Evaluate a student response as correct or incorrect.
- Provide appropriate feedback.
- Decide on the next action to be taken--i.e., proceed in sequence, or branch to another point in the lesson.

In the development of these frames, the basic ground rules and principles of instructional programming were followed--i.e.:

- Let the student know where he is going and why it is important.
- Inform the student of his performance over sets of subgoals.
- Provide clear instructions--avoid ambiguity in describing what is required.
- Keep information and feedback as straightforward and concrete as possible.

This process was repeated until the frames for all the tasks in a specific lesson were completed. These completed frames were incorporated into a PI lesson booklet. Each booklet contained the following:

- Section I - Lesson Objectives: States the learning objectives for the lesson.
- Section II - Lesson Content: Presents the instructional material in PI frame format.

Section III - Subject Review: Indicates subjects covered in the lesson and references the frames where each subject is presented.

Section IV - Performance Test and Scoring Key:

- a. Provides instructions on taking the performance test and types of test questions to be encountered.
- b. Presents the performance test.
- c. Provides a scoring key for self-scoring the test and references the frame where material pertaining to each test question is presented.

Section V - Self Evaluation: Specifies the criteria for successfully completing the lesson.

Programmed instruction booklets for 13 lessons were prepared following these procedures.

3.7.2 Audio/Visual (A/V) Instruction. A/V instruction consists of 35mm slides with synchronized narrative on a cassette tape. TAIS, criterion and enabling objectives, and test items for each task also served as the basis for this type of instruction. For each A/V lesson, slides were prepared and a script written. Tapes containing the narration and electronic pulses were prepared using a Wollensak 2548AV Recorder/Player. The pulses keep the slides and tape (narrative) in synchronization. Six A/V lessons were prepared in this manner.

The audio/visual instruction differed from PI as follows:

- Greater emphasis was placed on showing the procedural steps rather than discussing them.
- Procedures were broken down into detailed sequences.
- When questions were asked, students could not examine an answer printed in a following frame. Instead, a 5- to 20-second pause occurred to allow for answer review.

3.7.3 Audio (A) Instruction. Audio instruction consists of a taped narration used in conjunction with GDC equipment. This instructional mode was utilized to present the operating sequences for the Oxygen Breathing Apparatus (OBA), the Mark V Protective Mask, and the Twin Agent System.

A script was prepared for each lesson, which was recorded onto a cassette tape. The recorded tape is played on a portable Bell and Howell Model 3020 Tape Player. Each script takes the student through the procedures and checks necessary to operate the equipment. This mode of instruction was designed to:

- Provide hands-on experience with the equipment.
- Provide immediate feedback following a step or procedure.
- Permit timed practice sessions where this was deemed important--
e.g., Mark V Protective Mask.

Three audio lessons were produced, one each for the OBA, Mark V Protective Mask, and Twin Agent System.

3.7.4 Self-study Guides (SSG). Self-study guides contain the tasks (objectives), referenced Navy publications, criterion test items, and a method of evaluating performance. The requirements in two PQS 2 modules (2102, NBC Defense--Theory, and 2104, Safety Precautions) were incorporated into Self-study Guides. For each of these modules, the appropriate reference material was assembled and reviewed, applicable pages from each publication to meet the requirements stated in PQS 2 were reproduced, and test items to assess student mastery were developed. This material was organized into Self-study Guide booklets as follows:

- Section I - Introduction and Procedure: Purpose and organization of the booklet and procedures for its use.
- Section II - PQS Module: Reproduces the pages from PQS 2 for the module.
- Section III - References: Reproduces all applicable pages from the Navy publications referenced in the PQS 2 module.
- Section IV - Test: Presents the performance test.
- Section V - Scoring Key and Evaluation:
 - a. Provides a scoring key for self-scoring the test.
 - b. Specifies the criteria for successfully completing the material.

3.7.5 Lesson Content and Design. The modules are designed as independent units which can be taken in any sequence desired. Lessons within each module are also designed as independent units which can be taken in any order unless noted otherwise. The CII course structure is indicated in Table 3-6 and described in the following paragraphs.

TABLE 3-6
CII Course Structure

Lesson Number	PJS Number	Module/Topic	TAIS No. Sequence	Module	Unit Reference
	2101	Damage Control Theory		CII-DC	
1	2101.2	Compartmentation and Watertight Integrity (PI)	3001-3008		CW1
2	2101.3	Fire and Firefighting (PI)	3101-3105		FFF
3	2101.4	Battle Damage Types (PI)	3201-3205		BDT
4	2101.5	Battle Damage Repair (PI)	3301-3305		BDR
	2102	MBC Defense Theory (SSG)		CII-MBC	
	2104	Safety Precautions Theory (SSG)		CII-SP	
	2203	Firemain System		CII-PS	
1	2203.25-26	Magazine Sprinkler System (PI)			
1	2203.27-28	Water Washdown System	5201-5204		WWS
	2206	Fixed Damage Control Equipment System		CII-FDCE	
1	2206.21	Fixed CO ₂ System (PI)	5101-5105		FCO ₂
2	2206.26	Twin Agent System (APFF and PKP) (PI)	5301-5307		*TAS
3		Twin Agent System (APFF and PKP) (A/V)	5401-5406		TAS-A/V
4		Twin Agent System (APFF and PKP) (A)	5501		TAS-A
	2207	Portable Damage Control Equipment System		CII-PDCE	
1	2207.2	Hoses, Nozzles, and Foam Equipment (A/V) (2207.21 Pire Hose) (2207.22 All-purpose Nozzle) (2207.23 Low-velocity Fog Applicator) (2207.24 Portable Water Motor Proportioner) (2207.25 Navy Pick-up Unit (NPU) Nozzle) (2207.26 Foam Nozzle)	6101-6108		HNF-A/V
2	2207.2	Extinguishers (PI) (2207.27 CO ₂ Fire Extinguisher) (2207.28 Dry Chemical (PKP/ABC) Extinguisher)	6001-6010 6001-6005 6006-6010		EX
3	2207.2	Pumps/Eductors (A/V) (2207.29 P-250 Internal Combustion Engine Pump) (2207.210 Electrical Submersible Pump) (2207.211 Eductors (Pari or Single Jet) (2207.215 Eductor Discharge Hose)	6201-6210		PE-A/V
4	2207.2	Blowers and Lanterns (PI) (2207.212 Portable Electric Blowers) (2207.214 Flood and Battle	6301-6307		**BL
	2208	Personnel Protective Equipment System		CII-PPE	
1	2208.2	Protective Clothing (A/V) (2208.21 Proximity Suit and Gloves) (2208.22 Impregnated (permeable) protective clothing)	2501-2504		PC-A/V
2	2208.24	Mark V Protective Mask (MD MK-V) (PI)	2001-2010		MKV
3		Mark V Protective Mask (MD MK-V) (A)	2101		MKV-A
4	2208.28	CO ₂ Inflatable Lifejacket (A/V)	2601-2604		CO ₂ -A/V
5	2208.29	Casualty Dosimeter (DI-60/PD) (PI)	2301-2305		DI-60
6	2208.210	Pocket Dosimeter (DN-143/PD) (PI)	2201-2204		PD
	2210	Oxygen Breathing Apparatus (OBA) System		CII-OBA	
1	2210	Oxygen Breathing Apparatus (OBA) Type A-3 (PI)	1001-1009	OBA	
2		Oxygen Breathing Apparatus (OBA) Type A-3 (A/V)	1101-1106		OBA-A/V
3		Oxygen Breathing Apparatus (OBA) Type A-3 (A)	1201		OBA-A

*Originally specified as TAU.

**Data for the portable pneumatic blower (2207.213) not available for inclusion within the lesson.

3.7.5.1 PQS 2101, Damage Control Theory.

a. Content.

(1) Compartmentation and Watertight Integrity--numbering of ships compartments and material conditions of readiness.

(2) Fire and Firefighting--the fire triangle, nomenclature, and fire-fighting agents.

(3) Battle Damage Types--types of flooding and flood boundaries.

(4) Battle Damage Repair--dewatering, plugging, patching, and shoring.

b. Design.

All lessons in this module are PI. To enable efficient student learning, instruction on flooding (Lesson 3--Battle Damage Types) should be completed before instruction on dewatering techniques (Lesson 4--Battle Damage Repair). Each lesson defines all terms essential to the lesson topic and progresses to specific applications or techniques.

3.7.5.2 PQS 2102, NBC Defense Theory.

a. Content. NBC defense nomenclature, personal protective measures, decontamination techniques, and NBC agents.

b. Design. The design is SSG. PQS 2102 is reproduced and applicable pages of Navy publications are provided. Following this reference material, a self-test is provided.

3.7.5.3 PQS 2104, Safety Precautions Theory.

a. Content. Safety precautions for damage control including: handling of CO₂ extinguishers, use of internal combustion engines, fighting class "B" and "C" fires, and dangers involved with closed compartments.

b. Design. The design is SSG. PQS 2104 is reproduced and applicable reference pages provided. A self-test follows the reference pages for student assessment.

3.7.5.4 PQS 2103, Firemain System.

a. Content. A single lesson covering: Water Washdown System--a NBC protective system on weather decks and Magazine Sprinkler System--a fire prevention system for ship magazines.

b. Design. One PI lesson covering purpose of each system, how they function, and basic operation procedures.

3.7.5.5 PQS 2206, Fixed Damage Control Equipment System.

a. Content.

(1) Fixed CO₂ systems--hose and reel CO₂ firefighting systems and flooding CO₂ systems, including configurations, operation procedures, and alarm systems.

(2) Twin Agent System--chemical agents, operation procedures, and recharging the system.

b. Design. Two PI lessons, one A/V lesson, and one A lesson. One lesson in each medium for the Twin Agent System to provide extensive familiarization and practice opportunities. The PI lesson provides all operation procedures, the A/V lesson reviews these procedures with accompanying visuals, and the A lesson provides interaction with actual equipment.

3.7.5.6 PQS 2207, Portable Damage Control Equipment System.

a. Content.

(1) Hoses, Nozzles, and Foam Equipment--standard Navy firefighting equipment.

(2) Extinguishers--types of portable fire extinguishers available, types of fires for which they should be used, and operation procedures.

(3) Pumps and Eductors--P250 pump, electrical submersible pumps (AC and DC), and use of eductors.

(4) Blowers and Lanterns--portable blowers and their appropriate uses and types of portable lanterns.

b. Design. Two lessons are PI and two are A/V. They may be taken in any order except that the lesson on Fire and Firefighting (Lesson 2 of PQS 2101) is a recommended prerequisite to the lesson on Extinguishers (Lesson 2). The A/V lessons provide increased opportunities for component identification.

3.7.5.7 PQS 2208, Personnel Protective Equipment System.

a. Content.

(1) Protective Clothing--proximity suit and impregnated (permeable) clothing

(2) Mark V Protective Mask--components, operation procedures and care.

(3) CO₂ Inflatable Lifejacket--components, operation, features.

(4) Casualty Dosimeter--purpose, care, features, nomenclature.

(5) Pocket Dosimeter--purpose, care, features, reading.

b. Design. Both protective Clothing and CO₂ Inflatable Lifejacket are independent A/V lessons. Dosimeters is presented in PI with Casualty Dosimeter (Lesson 5) recommended before Pocket Dosimeter (Lesson 6) to allow for instruction on nuclear terminology. The Mark V Protective Mask is discussed in PI followed by a practice session on audio.

3.7.5.8 PQS 2210, Oxygen Breathing Apparatus.

a. Content. Inspection, operation cleaning, and storage of OBA.

b. Design. Initial instruction is PI. This lesson details all of the material with which personnel should be familiar. An A/V lesson follows reviewing primarily operation procedures (e.g., putting on the OBA harness). The final lesson is audio which requires putting on an OBA and firing an OBA canister.

3.8 Review and Revision (Step 8 in Figure 3-1). Representatives from NAVPERSRANDCEN and COMNAVSURFLANT visited SDC, Santa Monica, in September and October 1974 for an in-progress review of CII courseware. Completed PI booklets were examined, A/V lessons demonstrated, audio scripts critiqued, and the SSG format reviewed. Satisfaction was expressed by the reviewers as to organization and technical content of the CII materials. Differences between Navy publications and actual practice were reconciled and incorporated into the CII materials. In October 1974, a revised PQS 2, namely PQS 2A, was issued which modified the organization, format, and content of the CII materials. These changes were effected after discussions and agreements reached with NAVPERSRANDCEN and COMNAVSURFLANT.

3.9 Preliminary Tryout (Step 9 in Figure 3-1). The purpose of the tryout was to perform a small-group validation of the CII curriculum to answer the following questions:

- Are the instructional materials clear?
- Is the sequence of lessonware appropriate?
- Is additional instruction/practice needed in some areas?
- Are the materials positively received?

3.9.1 Preparation. From the pool of validated test items, two test versions for each module were prepared. The number of items for each pretest and post-test was:

<u>Module</u>	<u>Number of Items</u>
2101	58
2102	29
2104	17
2206	48
2207	57
2208	43
2210	46

Note: Test items for PQS 2203 were still included as part of the test for PQS 2206.

Items that appeared in both versions were treated as follows:

- The content of the alternatives contained within multiple-choice items was maintained but the order was varied.
- In cases where test items consisted of either a series of procedural steps or the identification of component parts, different steps and component parts were selected for each version.
- Certain items for which there was only one answer or only one job-oriented way of presenting the item were included in both versions (e.g., identify the canister stop on the OBA).

The test items for each version were assembled into card decks and listings were produced. Scoring keys for each version were also produced as listings from card input.

3.9.2 Subjects. Four novice subjects participated in the tryout of course materials. All subjects had recently completed boot camp and were currently assigned to FLETRACEN. Their average school grade completed was 10.8 and their average GCT score was 47.5.

3.9.3 Method. The on-line testing of subjects was accomplished off line with hardcopy pre- and post-module tests (Versions A and B). (The same technique was used during the validation of the test items.) These module tests are intended to assess student performance on all lessons in a given module as contrasted to performance tests contained within each lesson.

The preliminary tryout was conducted at the FLETRACEN Damage Control School, San Diego. Subjects were briefed as to the purpose of the project, what their participation would be, the general procedures that would be followed, and were asked to complete the CII Questionnaire.

Each subject was given a pretest (Version A) for one of the CII modules. The subject entered "start" and "end" times on the test. The test was scored immediately while the student moved to the instructional material developed for the particular module (PI, A/V, or SSG). Audio instruction was not administered during this tryout as the actual equipment required was not available. The "start" and "end" times were recorded for each lesson.

After the instructional materials for a CII module were completed, a posttest (Version B) was administered and scored. The subject again recorded "start" and "end" times. The subject then moved to the pretest for another module, and the sequence was repeated until all CII materials were completed. Subjects were encouraged to comment on CII material which they felt was unclear or confusing.

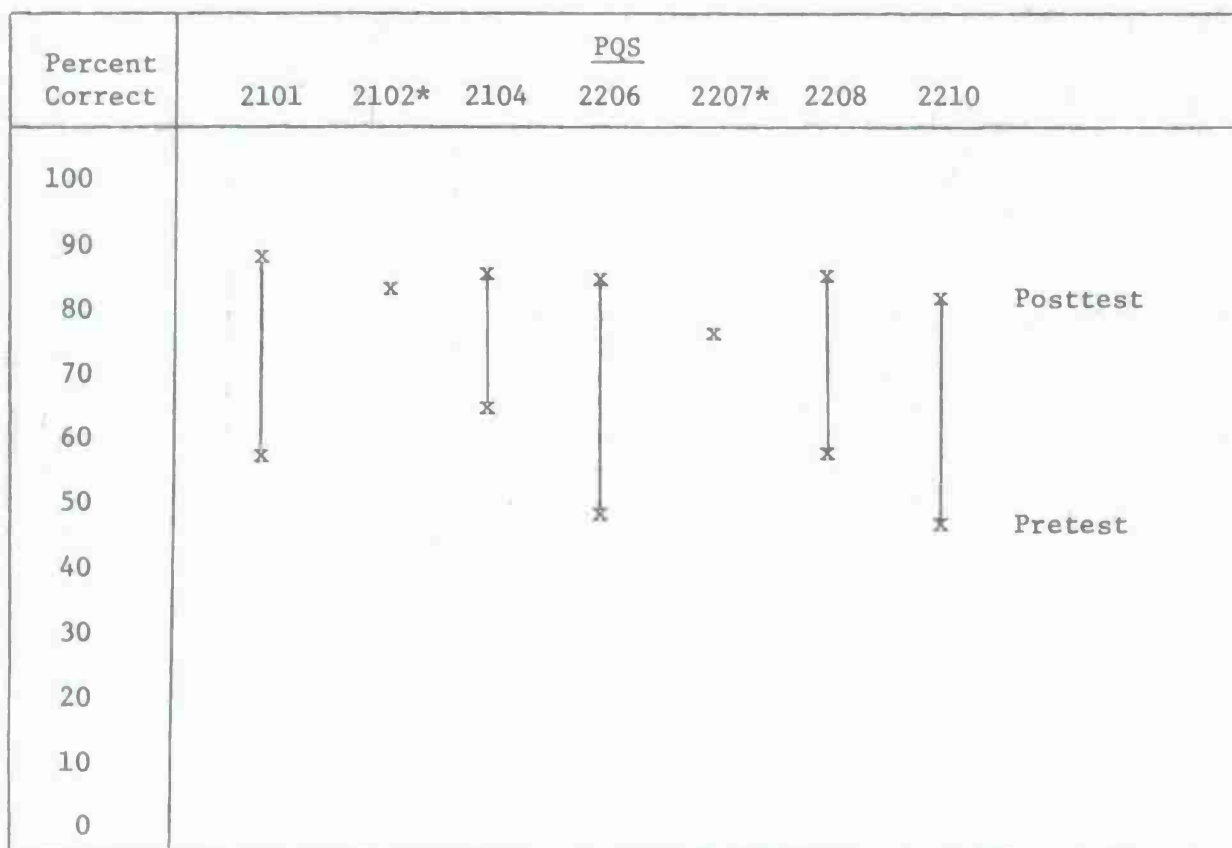
At the completion of the final posttest, each subject was requested to write a brief paragraph describing his experience and to complete an attitude questionnaire.

3.9.4 Results. Results of the tryout are shown in Table 3-7 and Figure 3-12.

TABLE 3-7
Results of Preliminary Tryout

	PQS						
	2101	2102*	2104	2206	2207*	2208	2210
Total Items	58	29	17	48	57	43	46
Pretest Mean Score	34	--	11	23	--	25	22
Percent Correct	58	--	62	48	--	58	47
Posttest Mean Score	51	24	14	39	42	37	37
Percent Correct	88	81	84	82	74	84	80

*Pretest data not available at time of tryout.



*Pretest data not available at time of tryout.

Figure 3-12. Comparison of pretest and posttest scores--preliminary tryout.

The subjects for this tryout scored very well on the pretests. The percentage scores range from 47 to 62. The posttest results indicate that instruction raised scores in all areas except PQS 2207 to the criterion level (80 percent). This PQS module covers 15 types of portable damage control equipment organized into four lessons--two PI booklets and two A/V sequences. The instructional material for this module was apparently not of sufficient depth to yield the desired criterion level.

Although the percentage score for PQS 2210 reached 80 percent, it may have been higher if the subjects had received A/V and audio instruction for the OBA.

The average time for each lesson is shown in Table 3-8. The subjects appeared to be a highly motivated group. They proceeded through the instructional material with a minimum of breaks. Their attitude toward the CII materials and modes of instruction was extremely favorable. They liked the course very much and felt that the technical detail, organization and amount of material was very satisfactory. Also, they indicated that

they encouraged problems in using the PI booklets, SSGs, and A/V equipment. All subjects thought that the self-paced structure of the materials was a very effective method of learning. Sample attitude statements follow:

"I thought this course was very good because it was simple and easy to understand. I think a person can learn very easily by this course. I know I did. I especially liked the A/V tests because I could just listen and then answer some questions. I would rather listen than read."

"Well, the way it was worked, I thought it was very good. Well, it's best to know how much you know before you start the lesson. Then afterwards find out what the lesson did for you learning-wise. Other than that, that's all I have to say, but it was set up very good and I got alot more out of it than I thought."

TABLE 3-8

Time Required to Complete Instruction (in hours)

PQS	Lesson	Type of Instruction				
		PI	A/V	SSG	A	
2101	CWI	1.50				
	FFF	1.17				
	BDT	0.80				
	BDR	0.80				
2102	NBC			2.53		
2104	SP			1.08		
2203	WSS	0.25				
2206	FCO ₂	0.67				
	TAS	1.28				
	TAS-A/V		0.60			
	TAS-A				**	
2207	HNF-A/V		0.40			
	EX	1.00				
	PE-A/V		0.50			
	BL	**				
2208	PC-A/V		0.17*			
	MKV	1.03				
	MKV-A				**	
	CO ₂ L A/V		0.25			
	DT-60	0.50				
	PD	0.25				
2210	OBA	0.67				
	OBA-A/V		**			
	OBA-A					
TOTALS		9.92	1.92	3.61		

*Lessons did not contain instruction on impregnated (permeable) protective clothing.

**Instruction not available for use during tryout.

SECTION 4. SHORE-BASED DEMONSTRATION

The shore-based demonstration was conducted during the period 11-22 November 1974. The purpose of the shore-based demonstration was a final tryout/checkout of the CII system prior to shipboard installation. This included computer programs and related procedures, and off-line training materials and procedures.

4.1 Preparation. The module tests (Versions A and B) were updated to incorporate changes and suggestions resulting from the preliminary tryout, and to reflect modifications caused by the issuance of PQS 2A. In addition, a prescriptive was formulated for each test item to indicate where instructional material could be found if the test item was missed. A prescriptive can contain up to 19 alphanumeric characters in any format.

The prescriptives developed for this project were designed and formatted as follows:

	Lesson Number: frame(s)
PQS Module:	Lesson Number: lesson name
	Type Lesson General Topic

Examples: (1) 2101:2:88-89
(2) 2207:3:PE
(3) 2102:SSG NBC

Decode: (1) Module 2101, Lesson 2, frames 88-89 in the PI booklet
(2) Module 2207, Lesson 3, Pumps and Eductors
(3) Module 2102, Self-study Guide, topic on Nuclear-Biological-Chemical

The test items for each pretest and posttest were entered into the test data base using a specially developed program. The correct answer, automatic fail indicator, and prescriptive for each item were also entered into the data base.

Each module was assigned a number within the test data base for ease of reference by the student as follows:

<u>PQS Module</u>	<u>Test Number</u>
2101	1
2102	2
2104	3
2206	4
2207	5
2208	6
2210	7

As a precautionary measure, hardcopy listings of the pretests and posttests for each module were produced for use during the demonstration in the event of system failure--which did not occur.

The number of revised test items for each pretest and posttest was as follows:

<u>PQS Module*</u>	<u>Number of Items</u>
2101	52
2102	29
2104	13
2203	6
2206	43
2207	62
2208	43
2210	44

*Test items for PQS 2203 were not included in the test item data base during the shore-based demonstration.

The CII materials were also updated as a result of suggestions and modifications indicated during the preliminary tryout, and revisions in PQS 2A. As a result of these changes, the lesson on Protective Clothing contained only material on the Proximity Suit. Material on the Impregnated (permeable) Protective Clothing was added to the lesson after the shore-based demonstration.

4.2 Subjects. Twelve recruits (eight seamen and four firemen) who had just completed boot training served as subjects. Background data for 11 of the 12 subjects showed a mean of 11.1 for highest school grade completed and a mean GCT score of 51.2. This information was not available for one subject. Representatives for NAVPERSRANDCEN, CNO (OP-91), CNO (OP-98), and COMNAVSURFLANT observed various portions of the demonstration.

4.3 Method. The shore-based demonstration was conducted at the SDC offices in Falls Church, Virginia and at a NOVA 1200 facility in Fairfax, Virginia (about eight miles from the SDC offices). Subjects and observers were oriented on the purpose and goals of the CII shore-based demonstration and on the specific procedures to be followed. After subjects completed the CII Questionnaire, they were given the "Introduction to CII Instruction" (Appendix A) to familiarize them with the total CII program. They were also given a handout titled "Index to Lessons and Self-Study Guides" (Appendix B) to use for monitoring their progress through the course.

Subjects were transported to the computer facility where two remote terminals (CRTs) were housed. Each subject followed the instructions provided on how to log in and operate the CII remote terminal, and took a pretest. Instructions for operating the CRT and CII A/V and A equipment are contained in Appendix C. When the subject completes a pretest, the CRT immediately indicates the results. He receives his score for comparison against the possible passing scores and associated prescriptives

for any test items missed. Figure 2-4 shows a sample display at the completion of a pretest.

If a subject failed the pretest, he returned to SDC to complete the appropriate instructional material. If he passed, he took additional pretests until a failure occurred.

After studying the CII instructional materials that related to a specific module test, the subject returned to the computer facility to take the module posttest. If he passed the posttest, the terminal display indicated that the module had been completed, awarded the appropriate points for the module, and indicated the subject's next option--a practical test if required, or the pretest for another module. If he failed the posttest (either by failing to achieve a criterion test score (80 percent), or missing an automatic fail test item) he received prescriptives and returned to SDC for further study. The instruction day lasted from approximately 0830 to 1530.

To avoid an early queueing problem at the two computer terminals, four subjects were given the same pretest in hardcopy form. Thereafter, all pretests and posttests were given on line (except for PQS 2203 which was not available at the time).

As the shore-based demonstration progressed, subjects were shifted to different course modules so that only four or five subjects were shuttled to the computer facility at a time.

When A/V instruction was required, the subject went to a room where the A/V equipment and materials were stored. The same equipment used for the preliminary tryout was available and the procedures were the same.

Equipment needed for use with the audio lessons on Oxygen Breathing Apparatus (2210) and the ND Mark V Protective Mask (2208.24) was available. However, the Twin Agent System (TAS) (2206.26) had to be simulated with a schematic drawing. The subject selected the appropriate audio lesson for the module he was studying and followed the printed instructions taped to the front of the tape player. For the audio lesson on the OBA and ND Mark V Protective Mask, he followed the audio lesson using the physical equipment as appropriate. For the lesson on TAS, he used the schematic drawing to simulate a dry run of the system by tagging (marking) the appropriate component parts. Schematic drawings depicting the correct tag placement were provided so the subject could check his answers. Appendix C, which provides instruction for operating the audio equipment, includes samples of drawings used with the TAS lesson.

At the completion of the final posttest, each subject completed the CII Attitude Questionnaire (Appendix D).

4.4 Results. Results are shown in Table 4-1 and Figure 4-2. As in the preliminary tryouts, the instructional materials helped subjects raise their test scores on CII module tests 20 to 30 percentage points. Pre-test percentage scores ranged from 41 to 67 with the exception of those

for PQS 2203 (81 percent). This was a short test (6 items) administered off line that was concerned with aspects of the Water Washdown System and Magazine Sprinkler System. Since 7 of the 12 subjects successfully passed the pretest, they did not have to take the posttest.

TABLE 4-1

Results of Shore-based Demonstration

	PQS Module							
	2101	2102	2104	2203	2206	2207	2208	2210
Total Items	52	29	13	6	43	62	43	44
Mean Pretest Score	29.2	17.4	8.7	4.8	21.4	32.3	21.0	18.1
Percent Correct	56	60	67	81	49	52	49	41
Mean Posttest Score	44.6	26.2	11.0	5.4	36.6	50.9	38.8	39.0
Percent Correct	86	90	85	90	85	82	90	89

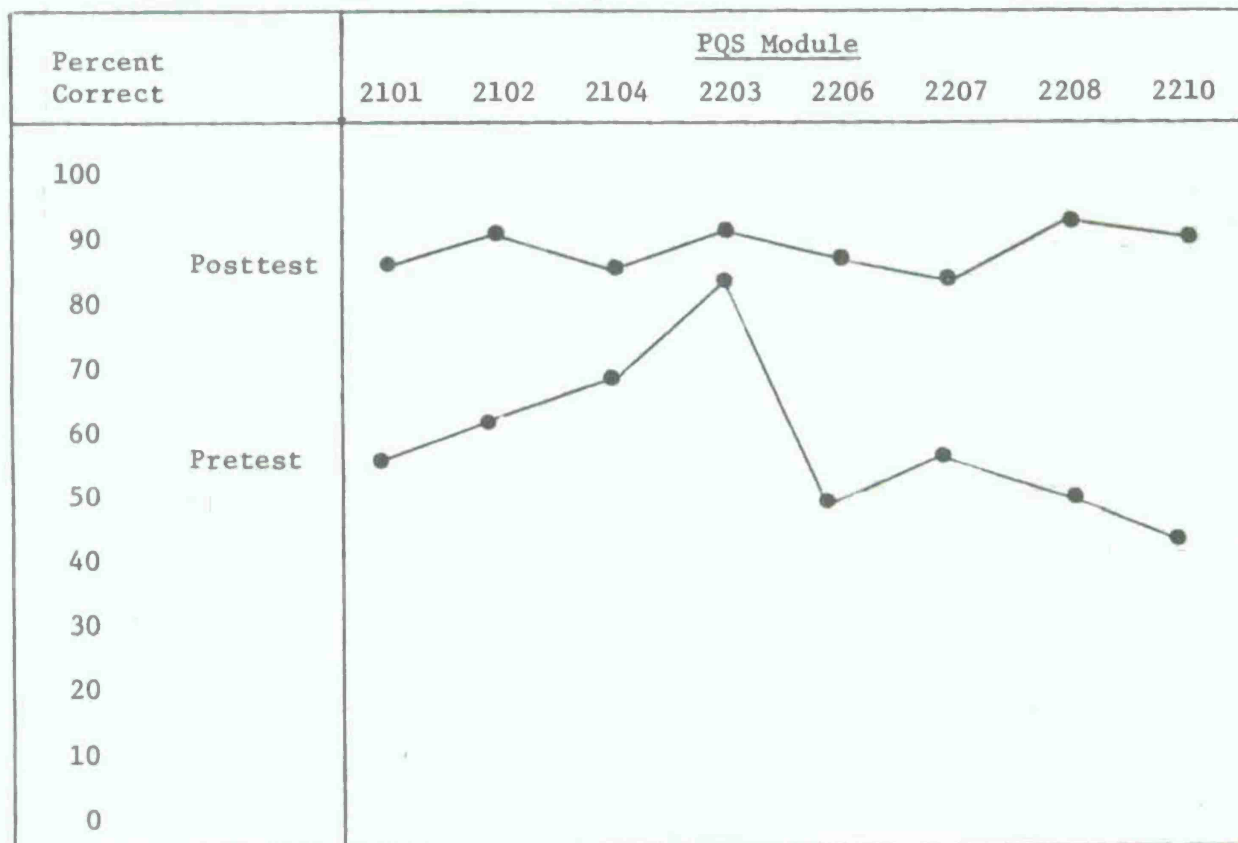


Figure 4-2. Comparison of pretest and posttest scores, shore-based demonstration.

The greatest improvement between pretest and posttest scores--from 41 to 89--occurred for PQS 2210, Oxygen Breathing Apparatus. It may be presumed that the instructional sequence of PI, A/V, and audio--the latter providing actual hands-on experience with the equipment--greatly contributed to this increase.

To achieve this improvement between pretest and posttest scores, some recycling--i.e., review of instructional material and retaking of tests--was necessary. Table 4-2 indicates that PQS 2201, General Damage Control Theory and PQS 2207, Portable Damage Control Equipment, were more difficult than the other CII modules. An examination of the learning objectives for these two modules indicates that they covered extensive material, required exposure to operational procedures for a variety of equipment, contained the most test items, and required greater knowledge of nomenclature than other modules.

TABLE 4-2

Test Recycling During Shore-based Demonstration

	<u>PQS Module</u>							
	2101	2102	2104	2203	2206	2207	2208	2210
Number Subjects Attempting PQS (Took Pretest)	12	12	11*	12	10*	11*	12	7*
Number Subjects Recycling Before Achieving Criterion	7	0	0	0	2	7	1	0

*Not all subjects attempted every CII module.

The average time required for each lesson (including short break periods) is indicated in Table 4-3. When these average execution times were compared with those obtained during the preliminary tryout (see Table 3-10), it was found that the time required for (1) PI materials was approximately 30 percent longer, (2) SSG materials was about the same (3.61 versus 3.96), and (3) A/V instruction increased because the lesson on the OBA was available for the shore-based demonstration. No comparison could be made for the audio lessons, since they were not available during the preliminary tryout. It should be noted that slight variations in execution time for audio lessons occur, depending on how often students turn off the tape to complete a particular instruction before continuing. The time needed to move to various components of the Twin Agent System aboard ship could not be calculated since these actions were simulated.

TABLE 4-3

Mean Time Required to Complete Instruction (in hours)
During Shore-based Demonstration

PQS	Lesson	Type of Instruction			
		PI	A/V	SSG	A
2101	CWI	2.75			
	FFF	1.20			
	BDT	0.80			
	BDR	1.30			
2102	NBC			2.30	
2104	SP			1.66	
2203	WSS	0.60			
2206	FCO ₂	0.95			
	TAS	2.00			
	TAS-A/V		0.60		
	TAS-A				0.33
2207	HNF-A/V		0.40		
	EX	1.40			
	PE-A/V		0.57		
	BL	0.30			
2208	PC-A/V		0.30		
	MKV	1.35			
	MKV-A				0.25
	CO ₂ L-A/V		0.25		
	DT-60	0.70			
	PD	0.50			
2210	OBA	1.40			
	OBA-A/V		0.42		
	OBA-A				0.42
TOTAL		15.25	2.54	3.96	1.00

The attitudes of the subjects toward the CII materials closely matched those obtained during the preliminary tryout. Subjects expressed positive reaction to all phases of the instruction and on-line testing program.

Typical comments were:

"It was fun."

"Easy to learn from."

"It was interesting."

"I learned lifesaving information."

"I could find out what I didn't know."

"It was a good course."

"Should help when I get aboard ship."

As in the preliminary tryout, the subjects felt that the technical detail, organization of material, and amount of material were satisfactory to very satisfactory. Regarding the different modes of instruction, five subjects preferred PI, although A/V instruction was a close second (three subjects). Ten subjects indicated that PI was a new experience. Seven subjects had never used A/V equipment before. The least liked mode of instruction by reporting subjects (N = 3) was the Self-study Guides. This was not unexpected as this mode of instruction approximates the current method available aboard ship in General Damage Control.

Subjects (N = 4) that took the OBA A/V lesson were very positive and confident that they could operate an OBA with a minimum of refresher instruction at some future date. Of particular interest was subject reaction to the on-line testing. Although the subjects had no prior experience with a remote terminal or a course or test administered by a computer, they had no difficulty in operating the remote terminal.

SECTION 5. SHIPBOARD INSTALLATION

The CII computer system was installed on DAHLGREN, which had recently returned from overseas deployment in December 1974. SDC completed the installation testing on 18 December and demonstrated the CII system to DAHLGREN personnel on 19-20 December 1974. SDC delivered printouts of the computer programs, data bases, dictionaries, CII question sets, copies of the computer programs, and data bases on cassettes. Copies of these materials were sent to NAVPERSRANDCEN on 23 December 1974.

The CII materials had been updated to reflect modifications resulting from the shore-based demonstration and changes imposed by the PQS 2A revision. The final CII curriculum appears in Appendix E. In addition, standard checklists for rating practical tests for the Mark V Protective Mask, Twin Agent System, and the Oxygen Breathing Apparatus were prepared. A sample checklist is shown in Figure 5-1.

PRACTICAL CHECKLIST

NAVEDTRA 43119-2, Watchstation - Shipboard Damage Control
Component 2301.111 - Mark V Protective Mask

NAME _____ SSN _____

The checklist below includes points important to every man seeking qualification in PQS 2, General Damage Control. The checklist is specifically designed to assist in determining proficiency in 2301.111; obtaining, checking, donning, and stowing a Mark V Protective Mask.

- properly dons mask carrier in side carry position Yes _____ No _____
- before donning, inspects protective mask
 eye-piece, headstraps, and pneumatic seal Yes _____ No _____
- properly adjusts headstraps for airtight seal Yes _____ No _____
- properly dons mask Yes _____ No _____
- clears masks after donning Yes _____ No _____
- tests for airtightness Yes _____ No _____
- dons mask in 10 seconds or less Yes _____ No _____
- correctly removes and replaces mask in carrier Yes _____ No _____
- correctly states how and where protective masks
 are to be stowed Yes _____ No _____

Criterion for proficiency: Meets at least 7 yes statements

Signature _____
 Training Official

Date _____

Figure 5-1. Sample practical checklist.

SECTION 6. DISCUSSION AND CONCLUSIONS

The PQS 2A for General Damage Control (GDC) specifies skills and knowledges required in 15 subject matter areas. Developing these skills and knowledges is left to the discretion of commanding officers, department and division heads, and other supervisors. Since their training methods invariably differ, it is difficult to assess an individual's qualifications accurately. This also applies to other PQS areas.

Personnel aboard ship have varied backgrounds in shore-based training, shipboard training, practical experience, and instructor duties with respect to GDC and other topics. If training needs of ship personnel can be more accurately identified, instructor and student effort can be directed toward areas in which the level of proficiency is below desired levels.

Training programs are needed to accompany or precede the operational introduction of new equipments. Manufacturers' instructions are generally not sufficient to train personnel adequately. Such training programs would immediately benefit Navy supervisors or instructors. In addition, when the equipment is installed and tested, trained personnel will be available to ensure that the equipment is operational and performs its specified functions.

This project developed Computer Integrated Instruction (CII) keyed to specific learning objectives for GDC PQS 2 modules selected for prototype CII development. The CII covers a wide range of GDC equipment and is effective in teaching the procedures, knowledges, skills, and safety requirements to operate and maintain the equipment. Subject matter experts have reviewed and evaluated the CII course materials and consider them valid. They were also reviewed with favorable response by NAVPERSRANDCEN, COMNAVSURFLANT, and representative ship personnel. Navy personnel appear to respond favorably to the CII five-step approach used to obtain proficiency:

- Pretest to determine areas of deficiency
- Programmed instruction to acquire the basic knowledge
- Audiovisual instruction to reinforce the learning and display step-by-step procedures
- Audio instruction to provide practical hands-on experience with equipment
- Posttest to demonstrate attainment of proficiency

SECTION 7. RECOMMENDATIONS

Based on the above conclusions, the following recommendations are made:

- The CII system developed to provide instruction in GDC should be applied throughout the Navy to lessen the workload of Fleet personnel, provide guidelines for testing personnel, and provide standardized instruction in GDC.
- CII should be developed to cover the remaining GDC areas in PQS 2 and for other PQS areas. The proven CII course methodology will be used.

- The CII test modules should be used throughout the Navy to identify personnel who are below desired proficiency levels. Training can then be scheduled for these personnel, while those whose proficiency is sufficient can pursue other training requirements. Test modules can easily be adapted for off-line use in cases where computer capabilities are not available.

- The methodology and principles used in developing CII course materials should be applied to training courses and standards for new equipment systems. These courses would provide familiarization and proficiency training to supervisory personnel aboard ship and to school instructors, and could be easily adapted to either shipboard or shore-based training on an individual or group basis.

- The off-line courseware developed for the CII course should be disseminated Navywide, and the methodology and instruction media used should be applied to other areas where day-to-day shipboard operations do not normally exercise the skills and knowledges required.

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GLOSSARY OF TERMS

ADP	Automatic Data Processing
ARI	Arithmetic
Audit Trail	Recording of significant activities
BASIC	Interpretive programming language
Byte	Storage for one character
CII	Computer Integrated Instruction
CII Programs	Computer programs for CII functions
Card Reader	Computer input device for punched cards
Cassette Tape	Small magnetic recording tape for computer
CLER	Clerical
COMMAND?	Request for user input
CPU	Central Processing Unit
CR	Carriage Return
CRT	Cathode Ray Tube
DGC	Data General Corporation
Data Base	Total amount of data for system use
Disk	Temporary data storage device
Display	To produce an image on the CRT screen
DOR	Date of Rank
EAM	Electric Accounting Machine
EAOS	Expiration Active Obligated Service
EDP	Electronic Data Processing
EQ	Equal
ESC	Escape Key
File	Storage procedure for computer data, usually consists of several records
File Identification	File name maintained by RDOS
Flag	Training Official Indicator
FNME	First Name
GCT	General Classification Test
GDC	General Damage Control
GMT	General Military Training
GR	Greater than
Hardcopy	Printed material
ID	Identification
I/O	Input/Output computer procedures
Initiation	To start a new function by setting the proper conditions at the computer
Interactive	Conversation-like use of computer
Line Printer	Printing device connected to computer
LNME	Last name
Log In	To identify yourself to the system to start system use
Log Out	To quit system use
Logical Record	Storage for related information usually consisting of more than one physical record
LS	Less than

MARST	Marital status
MECH	Mechanical
MI	Middle initial
Module	Independent course of study
Multiusers	More than one user simultaneously
NE	Not equal
NEC	Naval Enlisted Classification Code
Physical Record	A unit of hardware storage (128 bytes for the NOVA 1200)
PNEC	Primary Naval Enlisted Classification Code
Posttest	Test taken after study of training materials
PQS	Personnel Qualification Standard
PRATE	Present rate
Practical Exercise	Physical demonstration of procedure
Pretest	Test taken before study of training materials
PROJ	Projected Rotation Date
QUAL	Qualification
RDOS	Real-time Disk Operating System
Record	Storage procedure for computer data
RG	Range
SDC	System Development Corporation
SSN	Social Security Number
STAS	Shipboard Training Administration System
String	Units of related data
Tape Label	Tape name written on tape container
Tape Library	Repository for system tape cassettes
Training Official	Personnel officially designated by commanding officer to manage or operate CII
WIFENM	Wife's name

APPENDIX A

Introduction to Computer Integrated Instruction (CII)

NAVY PERSONNEL RESEARCH
AND DEVELOPMENT CENTER

Computer Integrated Instruction
General Damage Control

Introduction to Computer
Integrated Instruction CII

11 November 1974

NAVPERSRANDCEN

TDP 43-03.P14X1

Prepared For

Navy Personnel Research and Development Center

Prepared By

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1. Introduction

The Personnel Qualification Standard for Damage Control, Qualification Section 2, General Damage Control (PQS 2), NAVEDTRA 43119-2A contains the tasks covering the skills and knowledges required for General Damage Control, PQS 2.

The qualification card, Final Qualification in General Damage Control, NAVEDTRA 43119-2AQ1, is your record of satisfactory completion of the designated section of the Qualification Standard, PQS 2.

PQS 2 contains 16 sections or modules as follows:

THEORY

2101	Damage Control - Theory
2102	NBC Defense - Theory
2103	First Aid and Rescue Theory
2104	Safety Precautions Theory

SYSTEMS

2201	Damage Control Organization System
2202	Damage Control Communications System
2203	Firemain System
2204	Drainage System
2205	Ventilation System
2206	Fixed Damage Control Equipment System
2207	Portable Damage Control Equipment System
2208	Personnel Protective Equipment System
2209	Mechanical Foam/Aqueous Film Forming Foam
2210	Oxygen Breathing Apparatus (OBA) System

WATCHSTATIONS

2301	Shipboard Damage Control
------	--------------------------

2. Computer Integrated Instruction (CII)

To assist you in meeting the requirements for PQS 2, a General Damage Control curriculum called Computer Integrated Instruction (CII) has been developed. CII includes individualized instruction utilizing programmed instruction (PI), audio visual instruction (AV), audio instruction (A) and self study guides (SSG). CII also includes the module tests given on computer for the sections or portions of the sections for which CII course materials have been developed. The CII lessons developed and the media used are as follows:

2101 DAMAGE CONTROL - THEORY

- Lesson 1 - Compartmentation and Watertight Integrity (PI)
- Lesson 2 - Fire and Firefighting (PI)
- Lesson 3 - Battle Damage Types (PI)
- Lesson 4 - Battle Damage Repair (PI)

2102 NBC DEFENSE - THEORY

Self Study Guide

2104 SAFETY PRECAUTIONS

Self Study Guide

2203 FIREMAIN SYSTEM

- Lesson 1 - Water Washdown System/Magazine Sprinkler System (PI)

2206 FIXED DAMAGE CONTROL EQUIPMENT SYSTEM

- Lesson 1 - Fixed CO2 System (PI)
- Lesson 2 - Twin Agent Unit (PI)
- Lesson 3 - Twin Agent Unit (A/V)
- Lesson 4 - Twin Agent Unit (A)

2207 PORTABLE DAMAGE CONTROL EQUIPMENT SYSTEM

- Lesson 1 - Hoses, Nozzles and Foam Equipment (A/V)
- Lesson 2 - Extinguishers (PI)
- Lesson 3 - Pump/Eductors (A/V)
- Lesson 4 - Blowers and Lanterns (PI)

2208 PERSONNEL PROTECTIVE EQUIPMENT SYSTEM

- Lesson 1 - Protective Clothing (A/V)
- Lesson 2 - Mark V Protective Mask (ND MK-V) (PI)
- Lesson 3 - Mark V Protective Mask (ND MK-V) (A)
- Lesson 4 - CO2 Inflatable Lifejacket (A/V)
- Lesson 5 - Casualty Dosimeter (DT-60/PD) (PI)
- Lesson 6 - Pocket Dosimeter (IM-143/PD) (PI)

2210 OXYGEN BREATHING APPARATUS (OBA) SYSTEM

- Lesson 1 - Oxygen Breathing Apparatus (OBA) Type A-3 (PI)
- Lesson 2 - Oxygen Breathing Apparatus (OBA) Type A-3 (A/V)
- Lesson 3 - Oxygen Breathing Apparatus (OBA) Type A-3 (A)

Certain lessons are to be taken in the order stated for the module as earlier lessons contain data or procedures you will need to know before you can take the more advanced lessons for a given subject area.

3. Procedures for Taking CII Course Materials

The normal course of instruction for each module is as follows:

1. Take the pre-test on computer
2. Take the CII lessons for the module
3. Take the post test on computer
4. Pass any practical tests which may be required

If you pass the pre-test and any practical tests you will have demonstrated your proficiency and the appropriate entry will be made on your qualification card.

If you fail the pre-test, you take the CII lessons for the module and take the post test on computer when you feel you have mastered the skills and knowledges required. If you fail, the post test, you will be directed to take the CII lessons for the module over again.

In summary, successful completion of a CII module requires you pass either the pre-test or post test on computer plus any practical tests that may be required.

4. Taking Programmed Instruction (PI)

Programmed instruction (PI) is self-contained and unlike an ordinary course, textbook, or workbook, does not require the assistance of an instructor.

The instructional material has been arranged in a sequence of short statements called frames. The frames are numbered in sequence 1, 2, 3, etc. In each frame you are given some information; you use it to answer a question or complete a statement; and you find out immediately whether you have used it correctly. Since you will be participating actively at each point along the way, you will quickly grow confident of your ability. (Such rapid feedback as to how you are doing is possible only with programmed instruction or with a private tutor.)

As you go through the instructional material at your own pace, do not be surprised if the steps seem easy and you make very few mistakes. This is as it should be.

Instructions for the PI Booklet

1. You will cover the material in each PI lesson on a frame-by-frame basis from the first through the last item. These frames are numbered and separated by lines.

*

2. Toward the end of a frame you may be confronted with a decision of some type. This could be expressed in the form of a multiple-choice question, e.g.

What separates one frame from another? (Circle a letter)

- a. Lines
- b. Blank space
- c. Dashes
- d. None of the above

Answer as instructed above and then go on to the next frame to compare your answer with the correct answer.

*

3. a. LINES

The correct response is located in the upper left-hand corner of the next frame.

Perhaps you will be asked to supply the missing word in a blank. e.g.

Lines separate one _____ from another.

Your answer: _____

Put your answer in the space indicated by Your Answer: _____ and then go on to the next frame as before.

*

4. FRAME

You might just be required to select the correct response when given a choice of two (words) (pages). (Which?)

↑
[pick the answer which best
completes the sentence

Your answer: _____

*

5. WORDS

Some frames do not require you to make any type of decision (such as this one) and after reading the material, you move to the next frame.

*

6. Since you will often be called upon to make a response, it would be advisable to cover the answer that appears at the top of the next frame until you have decided on a response.

*

7. Take a piece of paper or cardboard sufficient in size to mask (or cover) these following frames.

↑ (put the top edge of
the paper here) now move this paper down to
the next frame of lines and
proceed to the next frame.

*

8. The most descriptive term for the use of this piece of paper would be a (Circle a letter)

- a. Frame
- b. Line
- c. Mask
- d. Slide

*

STOP

9. c. MASK

A small asterisk * will be located at the left-hand corner of the lines which separate the frames. This is done to indicate where the mask should be placed next.

Read the information contained in a frame, make your _____, then move the mask to the bottom of the next frame.

Your answer: _____

*

10. CHOICE, DECISION, etc.

*

11. Frame numbers are located in the upper left-hand corner of each frame.

*

12. Some frames will have a

QUESTION, with each possible answer containing an instruction as to where to go next.

This technique is called:

- | | |
|----------------------|----------------|
| a. Follow the leader | GO TO FRAME 14 |
| b. Solve the puzzle | GO TO FRAME 18 |
| c. Branching | GO TO FRAME 15 |

*

13. Since you are looking here, it is safe to assume that you did not follow instructions. Please go back to the above frame (#12), make another choice, and then go to the location specified directly to the right of the answer you selected.

*

14. You chose - a. FOLLOW THE LEADER

In a sense you do "follow" an instruction,
but probably a better term would be branching.

GO TO FRAME 16

*

15. VERY GOOD

*

16. Branching implies skipping, either forward or backward in the lesson. Skipping (branching) tailors the course to your needs for the instruction.

GO TO FRAME 20

*

17. You should not be looking here. Go back to the last frame and proceed as instructed.

*

18. b. SOLVE THE PUZZLE?

QUITE THE CONTRARY!

GO TO FRAME 16

*

- 19.

GO TO FRAME 23

*

20. You will be directed to GO TO: A specific frame number.

*

21. Remember that quite often you are not told where to go.

In these situations, you merely drop down to the next frame . . .
(like this one) . . . or turn the page if the frame is the last one
on a page.

*

22. . . . or you may be branched to another
location even though no question was asked. GO TO FRAME 19

*

23. The specified branching locations you will
encounter will actually appear as . . . GO TO FRAME 35

NOTE: Do not actually turn to
Frame 35. It is only being
used here as an example.

*

24. Should you desire a break or have other matters to attend to, please
do so only upon the completion of a lesson.

Now let's consider audio visual instruction.

*

5. Taking Audio Visual Instruction (A/V)

Audio visual instruction utilizes slides and tape cassettes to provide instruction for the lessons marked AV in Section 2. The audio (tape cassette) portion automatically advances the slides. If you want more time to look at the equipment or to select your answer, simply press the stop (orange) button. The audio portion will stop, holding the slide in place, until you are ready to go on - by pushing the start (green) button. The slides and audio will remain in synch (be together) no matter how often you start and stop the equipment.

A set of instruction is included with the equipment.

6. Taking Audio (A) Instruction

In audio instruction, you will be listening to a tape cassette while working with or facing the equipment. It is necessary to follow the directions closely, starting and stopping the tape as directed.

A set of directions for operating the playback unit is included.

7. Taking Self Study Guide Instruction

Follow the directions contained in the self study.

8. Taking the Module Tests on Computer

In taking the pre or post tests on computer, read the questions carefully and input your answer only as directed. Use of punctuation marks, wrong spacing or selecting what is in the alternative rather than the letter designation could result in your answer being considered wrong.

A set of instructions is included at the computer console.

9. Taking the Practical Tests

You will be informed as to the practical tests which may be required to complete a module. The practical test will be given by your Navy supervisor.

10. Filling Out the Qual Card

After satisfactory completion of a module, you will be credited with the appropriate number of points of your qual card and then be ready to start the next module, starting again with the pre-test.

APPENDIX B

Index to Lessons
And Self-Study Guides

NAME _____

DATE _____

SSN _____

PERSONNEL QUALIFICATION STANDARD FOR DAMAGE CONTROL
 QUALIFICATION SECTION 2 - GENERAL DAMAGE CONTROL
 INDEX TO LESSONS AND SELF-STUDY GUIDES

PQS
Number

Completed
 (✓)

2101 DAMAGE CONTROL - THEORY

Pretest

Lesson 1. Compartmentation and Watertight Integrity

Lesson 2. Fire and Firefighting

Lesson 3. Battle Damage Tapes

Lesson 4. Battle Damage Repair

Posttest

2102 NBC DEFENSE - THEORY

Pretest

Self-study Guides

Posttest

2104 SAFETY PRECAUTIONS

Pretest

Self-study Guides

Posttest

2203 FIREMAIN SYSTEM

Pretest

Lesson 1. Waterwashdown System and Magazine
 Sprinkler System

Posttest

NAME _____

PQS
Number

Completed

(✓)

2206 FIXED DAMAGE CONTROL EQUIPMENT SYSTEM

Pretest

Lesson 1. Fixed CO2 System

Lesson 2. Twin Agent System

Lesson 3. Twin Agent System (slide/tape lesson)

Lesson 4. Twin Agent System (tape lesson)

Posttest

2207 PORTABLE DAMAGE CONTROL EQUIPMENT SYSTEM

Pretest

Lesson 1. Hoses, Nozzles, and Foam Equipment
 (slide/tape lesson)

Lesson 2. Extinguishers

Lesson 3. Pumps and Eductors (slide/tape lesson)

Lesson 4. Blowers and Lanterns

Posttest

2208 PERSONNEL PROTECTIVE EQUIPMENT SYSTEM

Pretest

Lesson 1. Protective Clothing

Lesson 2. ND Mark V Protective Mask

Lesson 3. ND Mark V Protective Mask (tape lesson)

Lesson 4. CO2 Inflatable Lifejacket
 (slide/tape lesson)

Lesson 5. Casualty Dosimeter

Lesson 6. Pocket Dosimeter

Posttest

NAME _____

PQS
Number

Completed

(✓)

2210 OXYGEN BREATHING APPARATUS SYSTEM

Pretest

Lesson 1. Oxygen Breathing Apparatus

Lesson 2. Oxygen Breathing Apparatus
(slide/tape lesson)

Lesson 3. Oxygen Breathing Apparatus (tape lesson)

Posttest

APPENDIX C

Operating Instructions—
CRT, Audiovisual, and Audio Equipment

GENERAL DAMAGE CONTROL

COMPUTER INTEGRATED INSTRUCTION

The following instructions apply to the operation of the CII examination functions from the CRT terminal. For additional detail, see the CII User's Manual, UM-02. Note: If at times the screen display seems to hold - wait and take no further keyboard action until requested to do so by the proper display on your screen.

STEP 1. Turn on the CRT terminal; DGC READY will be displayed on the screen.

STEP 2. Push the ESC (Escape) key.

STEP 3. ACCOUNT ID: will be displayed on the screen. Type CIIS1, CIIS2, CIIS3, or CIIS4 after ACCOUNT ID depending upon the particular CRT you are using. The CRT number is affixed to the terminal. Please note: When you type CIIS the screen will show Xs instead of what you have typed for ID security. When you have entered the proper ID, push the carriage return (RETURN) key.

STEP 4. SIGN ON (time/date) will be displayed on the screen, for example, SIGN ON 1030 091274, and an asterisk (*) will be displayed on the next line.

STEP 5. Enter PAGE = 132 (space after PAGE, space after =), push carriage return.

*STEP 6. Enter RUN "CII" (space after RUN), push carriage return.

STEP 7. The system will display ENTER SSN. You should enter your Social Security Number with no spaces, for example, 123456789. Push carriage return.

STEP 8. The system will display the CII Examination Display as shown in the CII User's Manual; it will show you the commands you may use, and ask for a choice.

STEP 9. The entry of the command DISP asks the system for a display of your CII GDC progress status. You may enter after the term COMMAND? DISP and push the carriage return. You will receive a status display at the bottom of which is again the term COMMAND?.

*Start here if CII already running.

STEP 10. If you wish to take a GDC examination, enter the term EXAM. For example, COMMAND? EXAM and push carriage return. This command will get you into the examination procedures and you will receive on your screen a display called a "shopping list" from which you may select your next examination.

(A word on the third command, BYE. The input of this command after any display of COMMAND? indicates that you want to quit the system, that is, you have finished with whatever you wanted to do at this time.)

STEP 11. The "shopping list" will indicate the GDC modules that you have completed or the practical exercises that you have to do. If this is your first use of CII, no indication will appear, and the display will appear:

1. 2101
2. 2102
3. 2104
4. 2203
5. 2206
6. 2207
7. 2208
8. 2210

ENTER TEST NO. 1-8:

STEP 12. Make your module selection from the list and enter the module number as requested, for example, ENTER TEST NO. 1-8: 1 and push carriage return.

STEP 13. The system will display:

PRETEST FOR MODULE 1 IS NEXT
READY NOW? YES/NO

STEP 14. You have made your test selection and, if you are ready to start receiving the questions, enter the word YES. For example, READY NOW? YES/NO YES and push carriage return. If you enter NO you will be returned to a COMMAND? position for other action, for example, BYE to quit the system.

STEP 15. Following your entry of YES you will begin to receive the questions for the GDC module you selected. Under each question is the space for your answer. You will see: YOUR ANSWER IS. You will enter the answer you have chosen on the same line and push carriage return. For example, YOUR ANSWER IS A or YOUR ANSWER IS WATER.

STEP 16. Answer each of the questions as they appear. If you have no answer to the question just push the carriage return. Be careful with the carriage return key or you may enter a wrong or incomplete answer.

STEP 17. After you have answered the last question for the module you will receive a display that says: MODULE TEST COMPLETED. Under this you will have a display of your test results. Under this display is again the term COMMAND?. At this time you once again have the option to look at your status (DISP), take another module examination if you passed the first one (EXAM), or to quit the system (BYE).

STEP 18. If you did not pass the pretest, have studied the training materials and are ready to continue with the posttest for that module, you will enter the term EXAM as explained above, for example, COMMAND? EXAM. The system has a record of your pretest activity and your "shopping list" may look like the following example:

1. 2101 COMPLETED
2. 2102 COMPLETED
3. 2104 POSTTEST REQUIRED
4. 2203
5. 2206
6. 2207
7. 2208
8. 2210

POSTTEST FOR MODULE 3 IS NEXT
READY NOW? YES/NO

STEP 19. If you are ready to receive the posttest questions enter YES and a carriage return. A NO entry will return you to the COMMAND? position. For example,

READY NOW? YES/NO NO (and a carriage return)

YOU MAY NOW:

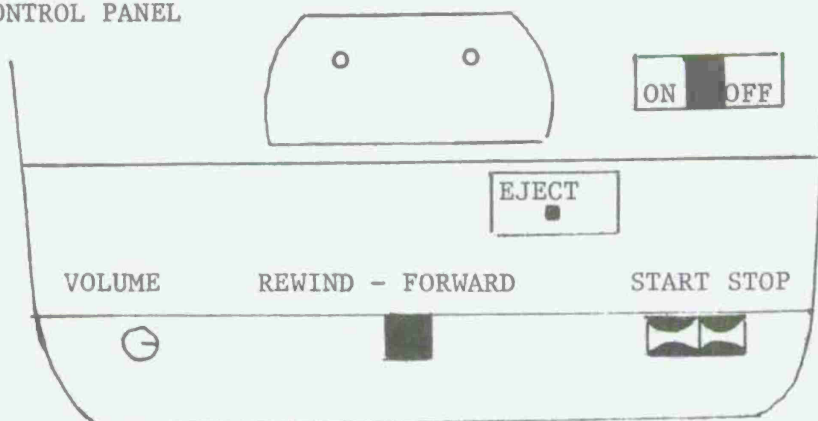
1. CHECK YOUR STATUS (TYPE DISP)
2. TAKE A TEST (TYPE EXAM)
3. LOG OUT (TYPE BYE)

COMMAND?

STEP 20. When you have completed a module pretest or posttest see your Training Official to discuss your next GDC activities and to receive a printed copy of your progress report.

Student Instruction for Operating
Audio/Visual Equipment

CONTROL PANEL



TO BEGIN THE LESSON:

1. Insert the tape cassette with the thick or open portion facing you. Be sure to push it all the way down into the recessed area.
2. Put on the headset.
3. Turn on the tape player by pushing the ON-OFF switch to the right.
4. Turn on the slide projector by moving the switch on the back of the slide projector up to HIGH.
5. Push the START (green) button on the control panel to begin the tape.
6. Adjust the volume by turning the volume control knob on the left side of the control panel.

AT THE END OF THE LESSON:

1. Push the STOP (orange) button to stop the tape.
2. Take off the headset.
3. Move the slide projector switch down to FAN for 2 or 3 minutes, then further down to the OFF position.
4. Push the REWIND-FORWARD switch to the left until the tape is rewound.
5. Remove the tape cassette by pulling the EJECT switch downward and lifting out the cassette.
6. Push the ON-OFF switch to the off position.
7. Push down and hold the gray SELECT button on the slide projector, then rotate the slide tray to the 0 (zero) position.
8. Check that the:
 - tape is rewound
 - tape player is off
 - slide tray is on 0
 - slide projector is off

Instructions for Operating the Audio Equipment

INSTRUCTIONS

1. Insert tape cassette by opening the top of the player and inserting the cassette with the open or thick portion facing you.
2. Push control switch on right side away from you to PLAY.
3. Adjust volume by turning the knob on the front of the player. Turning to the left will make the sound louder.
4. To stop the tape, pull the control switch back to the STOP position.
5. To rewind tape, return control switch to STOP, push control switch in toward REW (rewind), and hold.
6. To remove cassette, open top and lift cassette out.

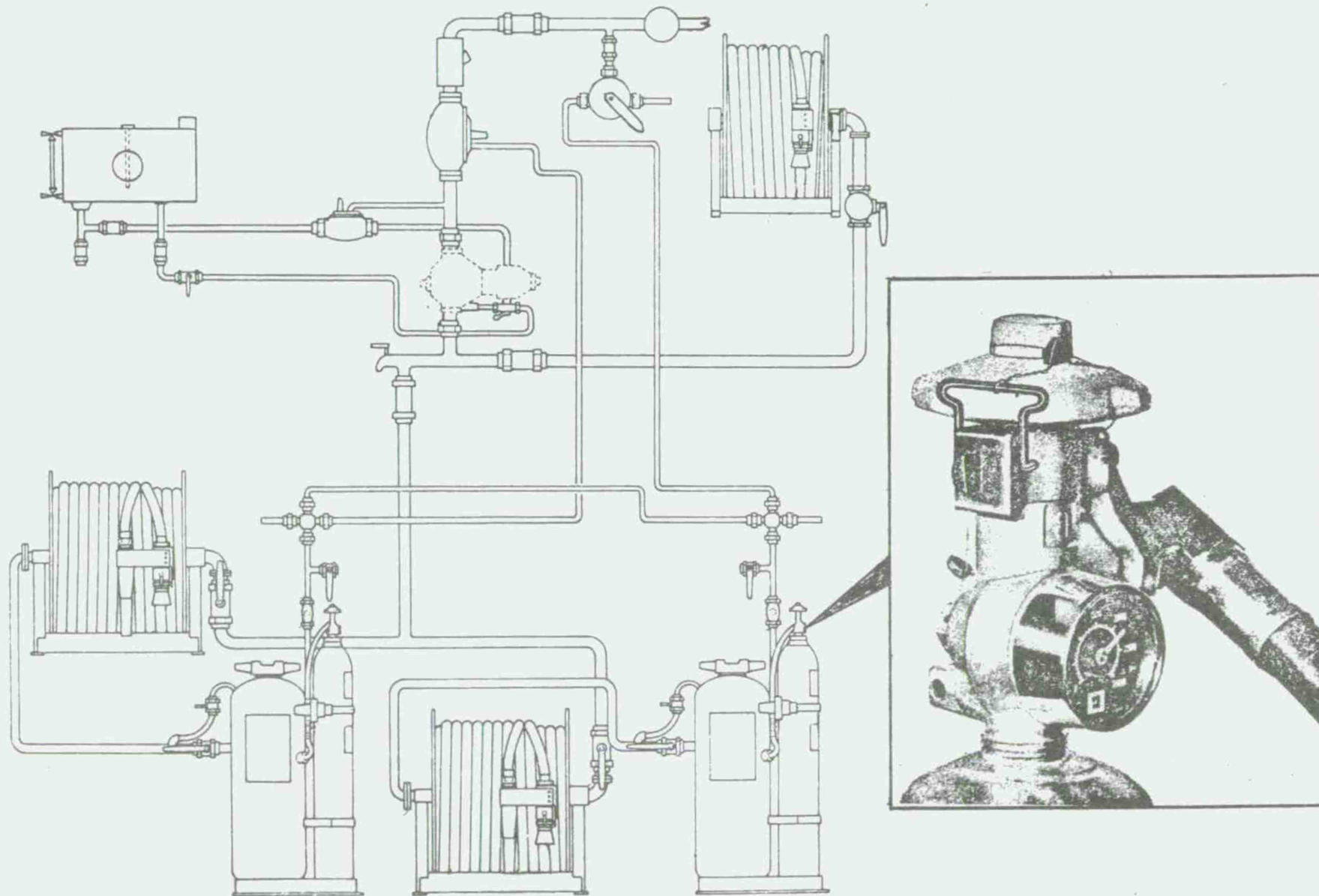


Figure C-1. Sample student worksheet - Fire Extinguishing System, Twin Agent.

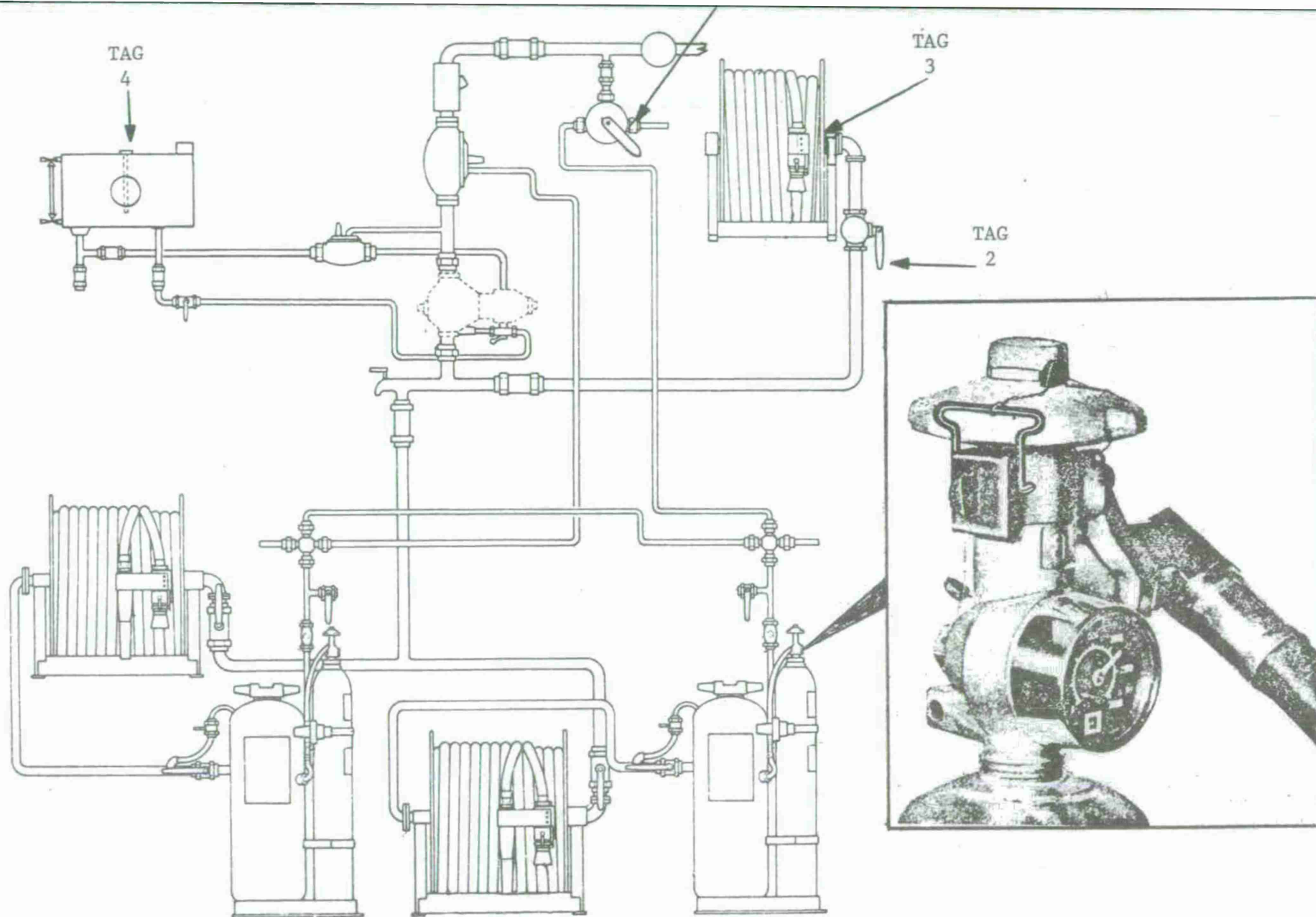


Figure C-2. Sample student answer sheet - Fire Extinguishing System, Twin Agent.

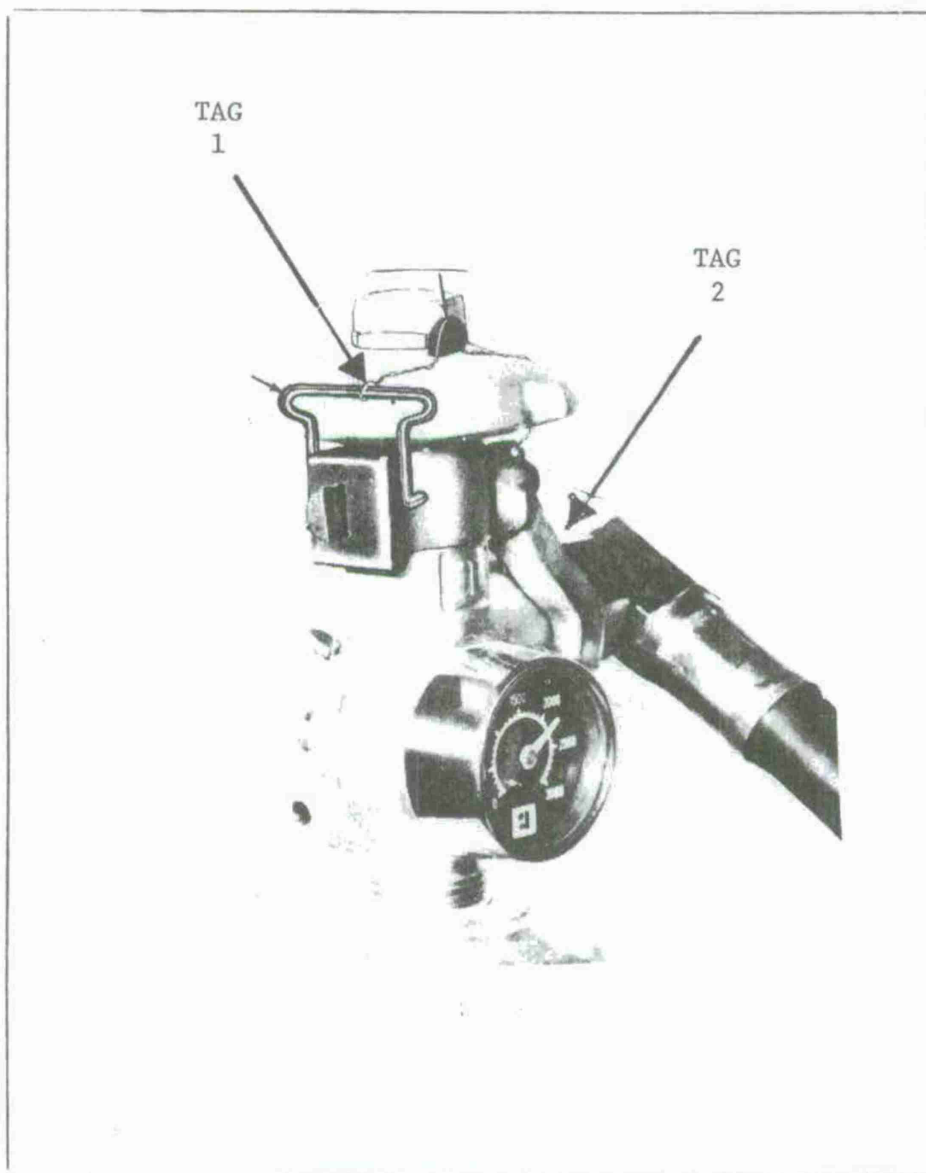


Figure C-2 (Cont.)

APPENDIX D

CII Attitude Questionnaire

CII DEBRIEFING QUESTIONS

NAME _____ SSN _____

ORGANIZATION _____ PHONE NUMBER _____

INTERVIEWER _____

1. What did you think of the CII course that you just went through?

2a. My attitude toward the course was that I:

- ☐ Disliked it very much
- ☐ Disliked it
- ☐ Neither liked nor disliked it
- ☐ Liked it
- ☐ Liked it very much

2b. Please comment on your answer.

3. Did you have any problems or difficulties in using the slide/tape equipment?

- ☐ Yes ☐ No

4. (If "yes" to item 3) please describe your most serious problem or difficulty.

5. I estimate that I understood _____% of the instructional material presented.

6. Describe any part of the total course content that was particularly good, and tell why.

7. Describe any part of the total course content that was particularly bad, and tell why.

8a. I think that this method of learning general damage material for PQS 2 is:

- ☐ Very effective
- ☐ Effective
- ☐ Borderline
- ☐ Ineffective
- ☐ Very ineffective

8b. Why?

9. For satisfactory understanding of the subject being studied, the amount of material (information) provided was:

- ☐ Much too large
- ☐ Fairly large
- ☐ About right
- ☐ Fairly small
- ☐ Much too small

10. The technical detail provided was:

- ☐ Very satisfactory
- ☐ Satisfactory
- ☐ Borderline
- ☐ Unsatisfactory
- ☐ Very unsatisfactory

11. The organization of the material presented was:
- ☐ Very satisfactory
 - ☐ Satisfactory
 - ☐ Borderline
 - ☐ Unsatisfactory
 - ☐ Very unsatisfactory
12. My understanding of the material presented was:
- ☐ Very satisfactory
 - ☐ Satisfactory
 - ☐ Unsatisfactory
 - ☐ Very unsatisfactory
13. The quantity of figures, exhibits, and other supplementary material provided was:
- ☐ Very satisfactory
 - ☐ Satisfactory
 - ☐ Borderline
 - ☐ Unsatisfactory
 - ☐ Very unsatisfactory
14. Were any of the supplementary materials irrelevant or unnecessary?
- ☐ Yes ☐ No
- 14b. If yes, which? _____
- _____
- 15a. Did you have any problems using the self-paced booklets?
- ☐ Yes ☐ No
- 15b. If yes, what were they? _____
- _____
16. Did you use the review section in the self-paced booklets?
- ☐ Yes ☐ No

17a. Did you have any problems scoring your performance test in the self-paced booklets?

☐ Yes ☐ No

17b. If yes, what were they? _____

18a. Did you have any problems using the self-evaluation section in the self-paced booklets?

☐ Yes ☐ No

18b. If yes, what were they? _____

19a. Did you have problems in taking the audiovisual lessons?

☐ Yes ☐ No

19b. If yes, what were they? _____

20a. Did you have any problems in using the self-study guides?

☐ Yes ☐ No

20b. If yes, what were they? _____

21. Have you ever had experience using audiovisual (slide/tape) equipment before?

☐ Yes ☐ No

22. If yes to 21, have you ever taken a course using audiovisual equipment before?

☐ Yes ☐ No

23a. Have you ever taken courses using self-paced booklets before?

☐ Yes ☐ No

23b. If yes to 23a, what type of courses? _____

23c. How many hours? _____

24. You had several methods of instruction--self-paced booklets, audio-visual equipment, self-study guides, and audio tapes.

What method did you like the best? _____

Why? _____

25. What method did you like the least? _____

Why? _____

26. Based upon your experience, what suggestions do you have for improving this course?

27a. In taking the computer administered tests, did you have any problems in using the remote terminal?

() Yes () No

27b. If yes, what were they? _____

28a. Have you ever taken a course or test by a computer before?

() Yes () No

28b. If yes to 28a, what type of courses or tests? _____

28c. How many hours? _____

29. How would you summarize your experience?

APPENDIX E

Final CII General Damage Control Curriculum

PQS 1 REFERENCE	MODULE/LESSON	MODULE REFERENCE	UNIT REFERENCE	INSTRUCTIONAL METHOD	ESTIMATED HOURS
2101	Damage Control Theory	CII-DC			5.5
2101.2	Compartmentation and Watertight Integrity		CWI	PI	(2.0)
2101.3	Fire and Firefighting		FFF	PI	(1.0)
2101.4	Battle Damage Types		BDT	PI	(1.0)
2101.5	Battle Damage Repair		BDR	PI	(1.5)
2102	NBC Defense Theory	CII-NBC			3.0
2102.1	Nuclear Defense		ND	SSG	(1.0)
2102.2	Biological Defense		BD	SSG	(1.0)
2102.3	Chemical Defense		CD	SSG	(1.0)
2104	Safety Precautions Theory (Includes 2104.1 through 2104.113)	CII-SP	SP	SSG	1.0
2203	Firemain System	CII-FS			0.5
2203.2	Water Washdown System/Magazine Sprinkler System (Includes following components: 2203.25 Magazine Sprinkling System Piping 2203.26 Magazine Sprinkler Cutoff Valves 2203.27 Water Washdown System Piping 2203.28 Water Washdown System Valves)		WSS	PI	(0.50)
2206	Fixed Damage Control Equipment System	CII-FDCE			3.0
2206.21	Fixed CO ₂ System		FCO ₂	PI	(0.25)
2206.26	Twin Agent System		TAS	PI	(1.25)
			TAS-A/V	A/V	(1.00)
			TAS-A	A	(0.50)

PQS 1 REFERENCE	MODULE/LESSON	MODULE REFERENCE	UNIT REFERENCE	INSTRUCTIONAL METHOD	ESTIMATED HOURS
2207	Portable Damage Control Equipment System	CII-PDCE			4.0
2207.2	Hoses, Nozzles, and Foam Equipment (Includes the following components: 2207.21 Fire Hose 2207.22 All-purpose Nozzle 2207.23 Low-velocity Fog Applicator 2207.24 Portable Water Motor Proportioner 2207.25 Navy Pick-up Unit (NPU) Nozzle 2207.26 Foam Nozzle)		HNF	A/V	(1.25)
2207.2	Extinguishers (Includes the following components: 2207.27 CO ₂ Fire Extinguisher 2207.28 Dry Chemical (PKP/ABC) Extinguisher)		EX	PI	(1.5)
2207.2	Pumps/Eductors (Includes the following components: 2207.29 P-250 Internal Combustion Engine Pump 2207.210 Electrical Submersible Pump 2207.211 Eductors (Peri or Single Jet) 2207.215 Eductor Discharge Hose)		PE	A/V	(1.0)
2207.2	Blowers and Lanterns (Includes the following components: 2207.212 Portable Electric Blowers 2207.213 Portable Pneumatic Blowers 2207.214 Flood and Battle Lanterns)		BL	PI	(0.25)
2207.216	Twin Agent System (AFFF and PKP) (Included under 2206.26)				

PQS 1 REFERENCE	MODULE/LESSON	MODULE REFERENCE	UNIT REFERENCE	INSTRUCTIONAL METHOD	ESTIMATED HOURS
2207.217	Oxygen Breathing Apparatus (OBA) (Covered as part of 2210)				
2208	Personnel Protective Equipment System	CII-PPE			4.5
2208.2	Protective Clothing (Includes the following components: 2208.21 Proximity Suit and Gloves 2208.22 Impregnated (Permeable) Protective Clothing)		PC	A/V	(0.50)
2208.24	Mark V Protective Mask (ND MK-V)		MKV MKV-A	PI A	(1.0) (0.50)
2208.28	CO ₂ Inflatable Lifejacket		CO ₂ L	A/V	(0.50)
2208.29	Casualty Dosimeter (DT-60/PD)		DT60	PI	(1.0)
2208.210	Pocket Dosimeter (IM-143/PD)		PD	PI	(1.0)
2209	Mechanical Foam Aqueous Film Forming Foam System	CII-AFFF			
2209.21	Water Motor Proportioner (Covered as part of 2207.24)				
2209.22	Navy Pick-up Unit (NPU) Nozzle (Covered as part of 2207.25)				
2209.24	Twin Agent (AFFF and PKP) System (Compliments 2206.26)				
2210	Oxygen Breathing Apparatus (OBA) System	CII-OBA			5.0
			OBA OBA-A/V OBA-A	PI A/V A	(3.0) (1.50) (0.50)

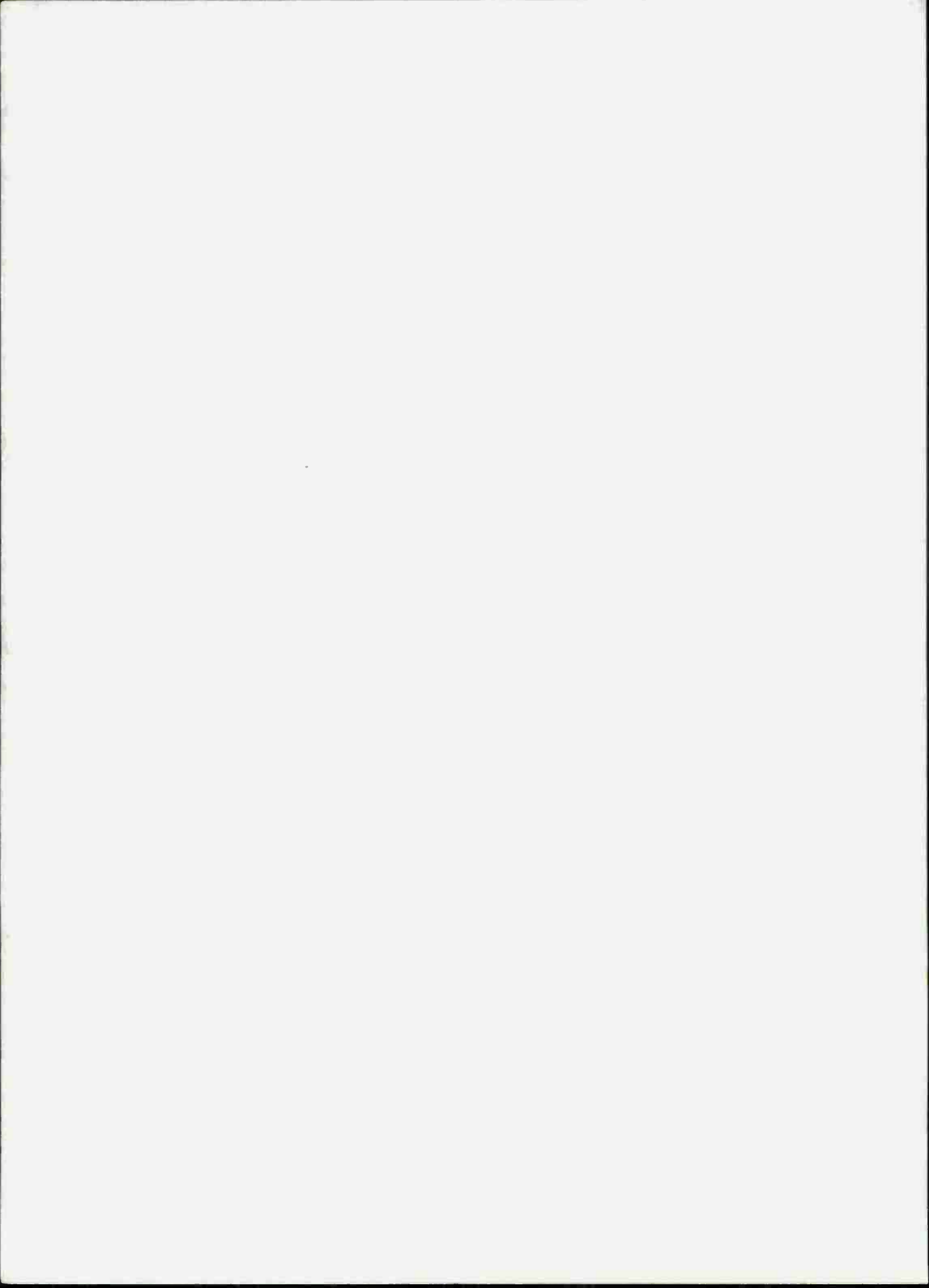
Summary Estimated Off-Line

Training Time

PI	15.25
A/V	5.75
A	1.5
SSG	<u>4.0</u>

*Total Estimated Training Time	26.5 hours
--------------------------------	------------

*Reflects adjustments caused by the incorporation of changes to NAVEDTRA 43119-2A, Personnel Qualifications Standard for Damage Control, Qualifications Section 2 General Damage Control



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The first of these is the fact that the
 government has been unable to
 maintain a stable currency. This
 has led to a loss of confidence
 in the government and a
 consequent loss of support.
 The second is the fact that
 the government has been unable
 to maintain a stable economy.
 This has led to a loss of
 confidence in the government
 and a consequent loss of support.
 The third is the fact that
 the government has been unable
 to maintain a stable political
 system. This has led to a
 loss of confidence in the
 government and a consequent
 loss of support.

The first of these is the fact that
 the government has been unable
 to maintain a stable currency.

The second is the fact that
 the government has been unable
 to maintain a stable economy.

U17122

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